SERVICE MANUAL

8200 SERIES ORGAN

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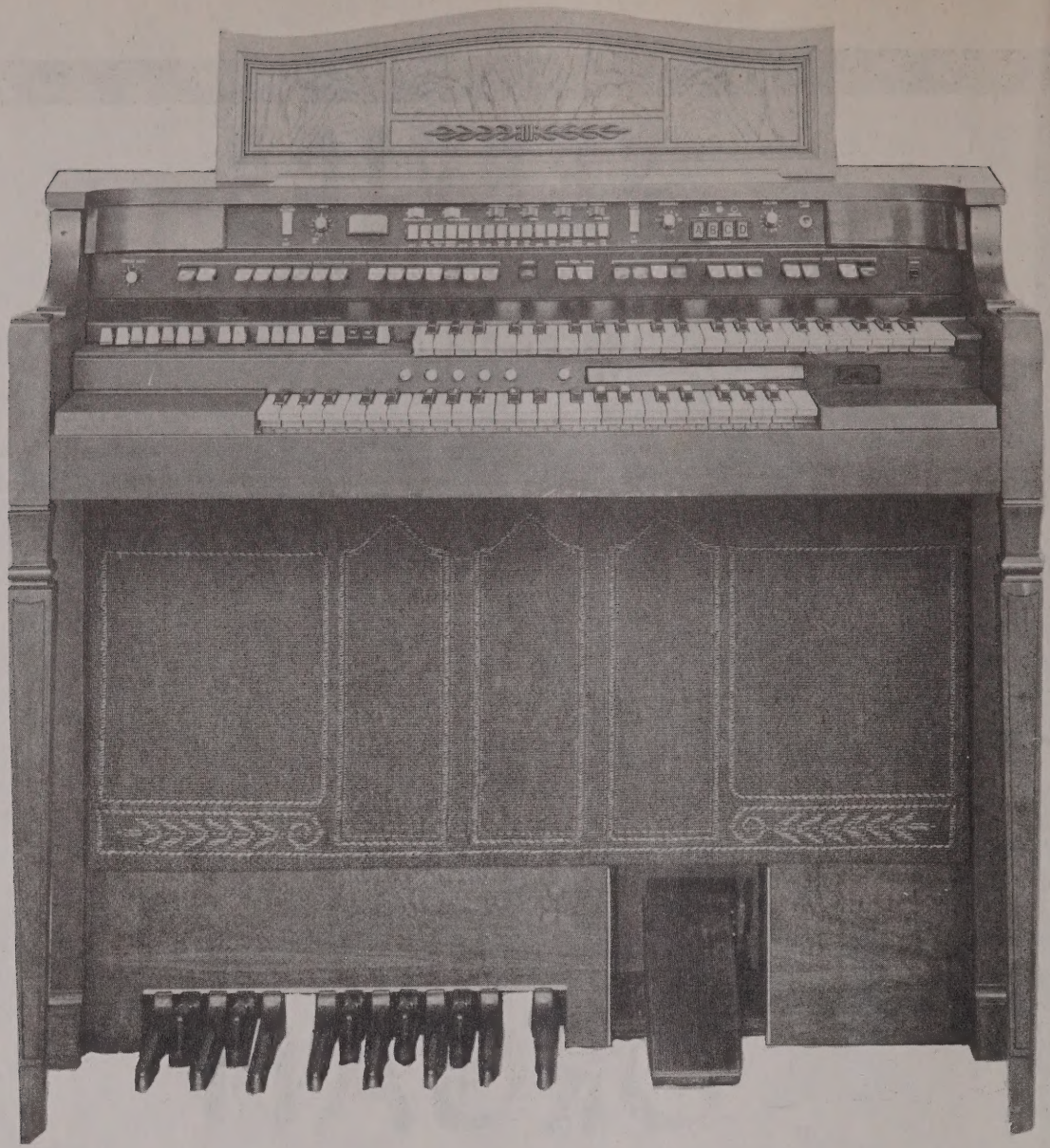


AURORA - 8200 SERIES

CABINET SIZE" - 451/2" Wide, 25" Deept, 40" High with Music Rack

WEIGHT: Approx. 240 with Bench

POWER INPUT: 120 Volts, 60HZ, 2.0 AMPS.

POWER OUTPUT : (2) Two Power Amplifiers rated at 35 Watts RMS each.

INTRODUCTION

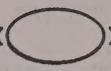
IN AN EFFORT TO PROVIDE THE SERVICE TECHNICIAN WITH ADDITIONAL ASSISTANCE IN TROUBLESHOOTING THIS INSTRUMENT, SEVERAL CIRCUIT SYSTEMS DIAGRAMS HAVE BEEN INCLUDEDED IN THIS MANUAL. THESE ARE IN ADDITION TO THE COMPLETE ORGAN LOGIC SHOWN AT THE BEGINNING OF SECTION III.

THIS HAMMOND ORGAN CONSISTS OF SEVERAL SYSTEMS WHICH ARE OPERATIONAL AS INDEPENDENT SYSTEMS AND IF A PROBLEM DEVELOPS, A SERVICEMAN MAY FIND THAT TROUBLESHOOTING WITHIN A SPECIFIC SYSTEM IS CONSIDERABLY MORE SIMPLE THAN USING THE ENTIRE ORGAN BLOCK LOGIC.

THE SYSTEMS ARE, FOR THE MOST PART, SEPARATE AND UNIQUE, EXCEPT FOR POWER SUPPLY VOLTAGES, AND DO NOT BECOME "MIXED" UNTIL THEY ENTER MIXER BOARD #2 CIRCUITRY. FROM THIS POINT ON, WE CONSIDER THE SHARED SIGNAL PATH AS A SYSTEM WHICH WE REFER TO AS THE SYSTEM MIXER AND AMPLIFIER. THE TOTAL NUMBER OF SYSTEMS ARE:

1. UPPER MANUAL TONEBAR AND PRESETS
2. UPPER MANUAL BRIGHT PERCUSSION
3. UPPER MANUAL SYNTHESIS PERCUSSION
4. LOWER MANUAL TONEBAR AND PRESETS AND VIBRATO CONTROL
5. PEDAL TONEBAR
6. RHYTHM SYSTEM
7. MIXER AND AMPLIFIER

THE LOGIC DIAGRAMS FOR EACH OF THESE SYSTEMS INDICATE THE SIMPLIFIED BLOCK DIAGRAM AND THE LOGIC SYSTEM DIAGRAM. ALL OF THE CIRCUIT CARD TERMINA-IONS FOR INPUTS AND OUTPUTS ARE INDICATED. THE TECHNICIAN SHOULD USE THESE AIDS TO HELP PINPOINT THE CUASE TO A SUB-ASSEMBLY CIRCUIT BOARD OR SWITCH WITHIN THE SYSTEM. THEN HE MAY REFER TO THE SEPARATE SCHEMATIC OF THAT SYSTEM TO LOCATE A SPECIFIC COMPONENT OR CONNECTION RESPONSIBLE FOR THE THE PROBLEM.

THE "FISH EYE" OR "FOOTBALL" (), WITH A NUMERICAL DESIGNATION WITHIN, PROVIDES THE TECHNICIAN WITH A QUICK REFERENCE TO THE INDIVIDUAL SCHEMATIC. THE SCHEMATICS ARE LOCATED IN SECTION III IN NUMERICAL SEQUENCE AS INDICATED BY THE NUMBER WITHIN THE "FOOTBALL".

THIS SAME "FOOTBALL" DESIGNATION APPEARS ON THE PHYSICAL LAYOUTS WHICH ARE USED IN CONJUNCTION WITH THE SET-UP PROCEDURE IN SECTION II AND THE PLUG LOCATION CHART USED IN CONJUNCTION WITH THE POINT TO POINT WIRING INFORMATION AT THE END OF SECTION III.

EACH OF THESE AIDS WILL HELP THE CERTIFIED AS WELL AS THE APPRENTICE HAMMOND TECHNICIAN IN ANALYZING AND CORRECTING CIRCUIT MALFUNCTIONS.

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SECTION I
HOW THE ORGAN OPERATES

AURORA - 8200 SERIES

1-1 GENERAL -
This section briefly describes the features of the instrument. It includes various functions and controls as well as effects they produce.

1-1 DESCRIPTION -
The 8200 Series "Aurora" is a self contained spinet organ, with two 44 note keyboards, plus a 13 note pedal keyboard. It uses a synthesis type tone generating system. Additional features include: Piston Preset, Tone Bars, Auto Vari - 64 Rhythm Unit with Auto-Accompaniment, and an Apreggiator Assembly. Also has Reverberation and Acoustic Tremolo. It is offered in five cabinet styles.

1-2 MANUALS -
The 8200 uses two (2) 44 note manuals (Keyboards), which has a single contact under each key. The manuals provide the means of switching and keying voltage to the divider keyers. Both manuals pivot or swing-up for easy access.

1-3 TONE SOURCE -
The Aurora utilizes the MDD (Mult.-Derivative Divider) system driven by a tunable oscillator associated with a Vibrato Oscillator. The Vibrato Oscillator produces two widths of Vibrato at one rate, affecting the entire organ.

1-4 TONE BARS -
Three groups of Tone Bar complement this spinet organ. There are nine (9) upper manual Tone Bars, two (2) Pedal 8' and 16', seven (7) lower manual Tone Bars. The green

1-4 TONE BARS CONTINUED -
lower manual Tone Bars provide mellow tones and the yellow a bright tone. The Tone Bars carry footage markings and control volume as on previous Hammonds, but are D.C. keyed instead of A.C.

1-5 PISTON PRESETS -
Depressing any one of the Piston Preset Buttons will produce a Preset tone in lieu of adjusting upper manual Tone Bars and percussion. These Pre-sets are useful when fast registration changes are required. When piston is engaged, Tone Bars and Voice Tabs have no effect. Animation (Vibrato-Tremolo), Reverb and Brilliance may be added to Piston Preset.

PRESET	TONE	TONE BAR SETTING
Clarinet 8'	Reed Sound	00 8080 800
String 8'	String Sound	00 8888 666
Full Tibias 16'	Theatre Organ Sound	80 6808 006
Theatre Brass 16'	Full Organ Sound	84 8868 668
Upper Tone Bar & Percussion	Cancels Presets and returns to Tone Bar and Percussion Registration.	

1-6 PERCUSSION -
A Percussion envelope affects tabs 2nd, 3rd and 5th pure harmonics and the bright filtered tone such as Pizzicato, Banjo, Harpsichord

1-6 PERCUSSION (CONTINUED) -
and Piano. There are four degrees of decay (long, medium, short and very short). Percussion fast when engaged, shorten all percussion decays (except Harpsichord and piano) to the decay time of the Pizzicato Tab.
The Poly-Synthesis Percussion, 2, 3 and 5 are pure harmonic percussion sounds. They are independent voices and can be mixed with Tone Bar or other Percussive Registrations.

The Glock is a 16' bell like tone. Twin Mallet Xylophone, is an 8' pitch xylophone effect, when repeat tab is added a twin mallet effect is heard.

The Twin Mallet Marimba is similar to the xylophone, but lower in pitch.

1-7 SECOND VOICE -
This tab function converts percussion voices to the organ mode.

Pizzicato 1 and 2 are two different filtered bright tones with a very short decay. When the second voice tab is depressed, these tones become organ voices, Oboe and Sax.

Banjo - With repeat tab depressed, creates a Banjo sound. Depressing second voice tab, this tone becomes a Post Horn sound.

Harpsichord - Creates a 17th Century instrument sound, depressing second voice converts this tone to a Violin sound.

Piano - Create the piano keyboard sound when second voice tab is depressed, converts tone for Diapason organ tone.

Piano Solo - Has the same quality as the Piano tab, but cancels all keyboard registration and Vibrato, it also sounds slightly louder.

1-8 SUSTAIN ON UPPER -
One sustain decay time is applicable to the upper manual tone settings only. It has no effect on Percussion or Piston Preset settings.

1-9 PEDAL (SUSTAIN AND MUTE) -
Sustain - Depressing tab adds approximately one second decay time to any pedal depressed.

MUTE - Gives pedals a more mellow or muted tone.

1-10 TREMOLO - ROTARY SPEAKER -
A two speed Hammond Acoustic Tremolo unit is used. Rotor runs at speed set by Acoustic Tremolo Tabs.

ACOUSTIC TREMOLO - "ON" upper or lower - These Tabs will channel sound of the upper and lower manuals from the stationary speaker to the revolving Tremolo speaker.

ACOUSTIC TREMOLO CELESTE - Tab will change speed of the rotating Tremolo speaker to a very slow, undulating speed.

ACOUSTIC TREMOLO CHORUS - Tab will create an equal mixture between stationary and rotary speakers of all tones directed to Tremolo Channel.

1-11 VIBRATO -
A master Vibrato oscillator provides a slow, narrow or a fast wide vibrato which is channeled to the stationary speakers only.

VIBRATO 1 - Creates a slow narrow Vibrato.

VIBRATO 2 - Creates a faster wider Vibrato.

DELAY VIBRATO - As upper manual key is depressed and held, the delayed Vibrato Tab provides a short delay before Vibrato effect is heard. For effect play notes in a slightly detached manner.

1-12 REVERB 1 & 2 -
Used singly or together, these tabs provide three degrees of Reverberation which is channeled to the stationary speaker.

1-13 BRILLIANCE -
This tab adds brightness to the manual tones. Has no effect on Pedals, Rhythm or Percussion.

1-14 VOLUME SOFT -
Depressing tab reduces the overall organ volume while still retaining full range of the expression pedal.

1-15 REPEAT TAB -
Applies Reiteration (Repeat) to all percussive voices except Piano Solo. The rate knob selects the desired speed of Reiteration, when used with Xylophone or Marimba tab. Depressed, two harmonics are gated alternately, creating a Twin Mallet effect.

1-16 EXPRESSION PEDAL -
The expression pedal controls the audio output of three channels simultaneously, Main, Tremolo and Rhythm. It also has a foot switch on the right side of pedal, actuating switch will cancel automatic Rhythm.

1-17 SPEAKERS -
The main speaker compliment consists of a 12" and a 6" speaker. The rotary Tremolo has an 8" round speaker.

1-18 PEDALS -
A 13 note spinet pedal of block module design is used. Single make contact to a common, used with a series of latching gates determines the desired bass notes. The latching keyers hold for at least four (4) seconds, but release instantly with the next pedal depressed.
There are two (2) pedal tone bars, 16' and 8', although they can be used independently, combining both tonebars will provide a richer bass sound.

1-19 ARPEGGIATOR -
The Arpeggiator consists of a gold mylar strip mounted between the upper and lower manual. A two (2) position switch to the right of the mylar strip allows the player to select manual or automatic mode. When the manual mode is selected, running thumb along mylar strip sounds a scale composed of notes keyed on the lower manual, in voices selected on the upper manual. In Automatic mode, moving thumb along mylar strip produces a pleasing arpeggio in proper whole tone scale to harmonize with keys depressed on the lower manual. When no keys are depressed, running thumb along Arpeggiator strip produces every note of a chromatic scale (Glissando) in manual or automatic mode. Although lower manual keys and voices remain operable, the Arpeggiator can key upper manual voices only.

1-20 AUTO VARI - 64 - AUTOMATIC RHYTHM AND ACCOMPANIMENT -
The Auto Vari has 16 Rhythm patterns controlled by interlocking push buttons which can be depressed singularly or in two or three pattern combinations. There are four lighted variation switches which select any one of four variations of the sixteen Rhythm patterns. These variations can be activated automatically by setting the Auto Vari switch to any of the six measure rates. If the six position measure rate knob is placed on the "2" position, every 2 measures, a new variation will be selected automatically in an A, B, C, D sequence.

THE SILENT SOUND SWITCH - In the silent position, Rhythm cannot be heard but play along voices (Brush, Cymbal, Etc.) can be.
In sound position, Rhythms will sound, starting on beat one at measure one. There is a volume control and a tempo control, which varies output and tempo rate from 12 to 75 measures per minute. There are four play along voices, Brush and Snare triggered by the lower manual and Cymbal and Bass triggered by the pedals.

1-20 AUTO VARI - 64 - AUTOMATIC RHYTHM AND ACCOMPANIMENT (CONTINUED)

AUTO ACCOMPANIMENT - Depressing lower manual keys or pedals will activate pedal chord rhythms automatically to a pattern and tempo selected.

1-21 MUSIC LAMP -
Switch to the right of the Rhythm Unit, independent of the organ power switch. It will illuminate sheet music placed on top rack.

1-22 PHONO INPUT -
Located on the power amplifier chassis, an RCA type jack is provided for use with external signal generating devices. Input impedance is 50K ohms and maximum signal acceptable is 0.25 RMS.

1-23 HEAD PHONE JACK -
The phone jack is located on the right side of organ and under lower manual. It is connected so as to silence both the internal and optional remote speakers when the plug is inserted.

1-24 AMPLIFIER -
The power amplifier assembly include two (2) 35 watt amplifier modules and fused protected. Phono jack, tone cabinet and Tremolo relay are also included.

1-25 REMOTE TONE CABINET -
A socket is provided on the amplifier suitable for a Leslie #700 Series Tone Cabinet. The organ tabs affecting channeling and Tremolo speed in organ will perform the same modes in the #700.

1-26 CASSETTE RECORDER (OPTIONAL)
The organ is not equipped with an in-built cassette recorder, but provision is made for easy installation of cassette kit #130-10300.

SECTION II
DISASSEMBLY AND MAINTENANCE

8200 SERIES - AURORA

DISASSEMBLY

2-1 GENERAL - The following instructions describe a main disassembly sequence and procedure for removing and replacing specific assemblies. Re-assembly is accomplished by using reverse procedure. It is very important that care is taken to avoid damaging or scratching organ finish or assemblies when handling or removing. For access to any specific component or assembly, it may be necessary to use combinations of several of these steps.

2-2 REMOVE REAR COVER (BACK)

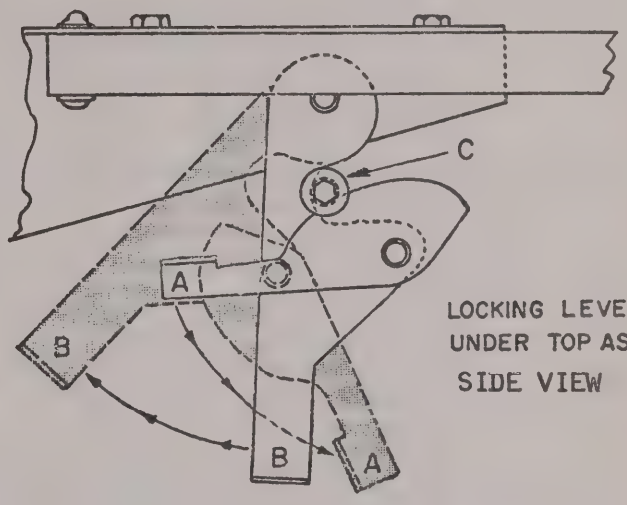
a) Remove two bronze screws mounting rear cover to manual shelf.
b) At top of cover twist plastic thumb fasteners to a horizontal position and remove screw near A.C. Line Cord, remove back.
c) By removing rear cover. all A.C. line voltage has been broken to organ. The A.C. cord and rear cover are of an interlock type to the power supply. of the organ.

2-3 TOP ASSEMBLY TO SWING UP (CONSISTS OF TOP RHYTHM - 64 ASSEMBLY AND TAB/ SWITCH CONTROL PANEL ASSEMBLY)

a) With rear cover removed, from rear of organ, reach into organ on each side and locate locking lever mounted to control panel brackets. See Figure #1.
b) Pull down and toward rear of organ lever "A". Push lever "B" slightly forward unlocking lever from stationary Pin "C".
c) From front of organ grasp top on each side and swing-up top and control assembly.

2-3 TOP ASSEMBLY-TO SWING UP CONTINUED

d) With top assembly in the swing-up position locate on the left hand side of organ, a locking hinge. With hinge in a straight position, push down on center locking strip of hinge. Panel is now locked in the swing-up position.



LOCKING LEVER UNDER TOP ASY
SIDE VIEW

FIG. #1

2-4 REMOVAL OF PRINTED WIRING BOARDS FROM UNDERSIDE OF CONTROL PANEL ASSEMBLY.

a) PWB Boards can be removed by releasing spring clips on bottom of PWB and let board come down far enough to clear upper board holders.

2-5 TO SEPARATE CONTROL PANEL ASSEMBLY FROM TOP AND AUTO VARI ASSEMBLY (GAIN ACCESS TO AUTO VARI - 64 ASSEMBLY)

a) Locate slotted locking screw on each end of control panel bracket, just above lever lock. Turn lock screw so that slot is in the horizontal position, this releases control panel assembly from top and Auto Vari Assembly.

b) Gently lower control assembly. It will be held by slide hinge fastened to control panel shelf and Auto Vari bracket.

c) Holes are provided in the Auto Vari cover for adjusting potentiometers if necessary.

d) To gain access into Auto Vari Rhythm Assembly, remove ten (10) hex screws holding cover to Auto Vari chassis. Remove cover.

e) Re-assembly by reverse procedure. To mate control assembly to top assembly swing-up control panel and join top assembly, turn locking screw to vertical position fastening the two units together.

2-6 TO REMOVE AUTO VARI RHYTHM ASSEMBLY.

a) Follow steps as indicated in 2-5, A & B.

b) Remove Tempo, Measures and volume knobs, also remove caps from toggle switches. Remove Music Lite switch wires from plastic clip on right side of Auto-Vari.

c) Remove three (3) hex screws (each side) mounting Auto Vari.

d) Unplug LEDs from Rhythm Units leaving LEDs mounted to control panel.

e) Remove complete unit.

2-7 TAB AND SWITCH ASSEMBLY REMOVAL

a) Follow steps as indicated in 2-5, A & B.

b) With top and Auto Vari in up position and control panel in the down position, remove two (2) screws (each side) from top of control panel mounting panel to metal bracket.

2-7 TAB AND SWITCH ASSEMBLY REMOVAL (CONTINUED)

c) With shelf and panel propped up, remove from bottom of control panel (each side), stud and nut. Care should be taken to avoid dropping nut into organ.

d) Pull control panel forward to clear bracket and tilt up.

e) To remove tab and switch assembly, locate "U" spring clip on bottom of tab module to be replaced. With pick or similar tool, pry down and remove clip.

f) By carefully guiding tab assembly down and out of control panel/window, module will be free to be worked on.

g) To re-assembly tab and switch assembly to control panel, guide tab assembly back through panel window, insert top portion of module in slot in top of control panel. When tab assembly is in proper position, replace "U" spring clip.

2-8 UPPER MANUAL (TO SWING-UP)

a) From under lower manual shelf and toward rear, locate and remove two (2) 1/4 x 3½" bolts each side. Manual is now free to be lifted into the swing-up position.

b) Grasping each end of upper manual assembly (not by keys) swing hinged manual into an upright position.

NOTE: TO REPLACE UPPER MANUAL KEYS, FOLLOW PROCEDURE OUTLINED IN STEP 2-27.

2-9 FRONT STRIP BETWEEN UPPER MANUAL AND CONTROL ASSEMBLY. (REMOVAL)

a) Follow steps as indicated in 2-5, A & B.

b) With top and control assembly in the up position, remove five (5) Phillips head screws from TOP of front strip mounting.

c) CAUTION: With strip loose carefully remove preset lite from front strip by loosening collar and separating lite from strip.

2-10 TONE BAR ASSEMBLY - REMOVAL OR ACCESS TO.

a) With front strip removed as in Step 2-9, remove small hex head screws from top of Tone Bar Assembly mounting assembly to base.

b) Bring Tone Bar Assembly up and forward to clear barcket. Unit is free to be worked on-

c) To completely remove a Tone Bar Assembly, disconnect cable leads. Reverse procedure for re-assembly.

2-11 PISTON PRESETS AND ARPEGGIATOR FRONT STRIP (TO GAIN ACCESS)

a) With upper manual in the up position as in step 2-8, A & B, remove from the bottom rear of front strip, five (5) hex head screws mounting front strip to upper manual frame assembly.

b) Carefully bring front strip forward gaining access to piston presets and Arpeggiator.

2-12 PISTON PRESETS - REMOVAL

a) Follow Steps 2-11, A & B.

b) From bottom and to the front of front strip remove three (3) hex screws, unplug connector and remove presets.

2-13 ARPEGGIATOR - REMOVAL

a) Follow Steps 2-11, A & B

b) From under side of front strip with pick or similar tool, pry up and out six (6) spring clips holding Arpeggiator Assembly to front strip. Remove Assembly. Re-assembly in reverse procedure.

2-14 UPPER OR LOWER MANUAL PWB REMOVAL

a) With manual in the up position, remove five (5) hex screws mounting manual Printed Wiring Boards to manual frame. Care must be taken when removing as not to damage or bend contacts. Re-assemble with care

2-15 LOWER MANUAL (LIFT AND SWING-UP)

a) Upper manual in the swing-up position as indicated in Steps 2-3, A thru D.

2-15 LOWER MANUAL (LIFT & SWING-UP) (CONTINUED)

b) Remove from under lower manual shelf two (2) 1/4 x 3/4" bolts, also remove screw at far right. Manual can be lifted into position.

CAUTION: WHEN RAISING LOWER MANUAL, BE SURE CABLE AT P806 & 807 ARE DRESSED SUCH THAT THE MANUAL EXTRUSION DOES NOT APPLY EXCESSIVE PRESSURE TO PEDAL GATE/SYNC AMP. PWB.

NOTE: TO REPLACE LOWER MANUAL KEYS, FOLLOW PROCEDURE OUTLINED IN STEPS 2-27.

2-16 PHONE JACK AND END BLOCK ASSEMBLIES

a) The removal of some sub-assemblies is obvious. These will not be discussed.

2-17 EXPRESSION PEDAL ASSEMBLY - REMOVAL

a) From front of organ remove four (4) screws mounting swell pedal to bottom wood shelf, swell lifts out.

2-18 REMOVAL OF DAUGHTER BOARDS - FROM REAR OF UPPER MANUAL SHELF.

a) With pick or other similar tool pry up two (2) spring clips holding Printed Wiring Boards to brackets. Care must be taken to avoid cracking or breaking board.

b) Slightly pull to rear (to clear wood cross member) and up, unplugging from Mother Board.

2-19 STACKED LARGE GENERATOR AND KEYER DIVIDER ON MANUAL SHELF. (REMOVAL OR GAIN ACCESS TO)

a) Follow Steps 2-2, 2-3 and 2-18 if necessary.

b) With top assembly in the up position (Step 2-3) remove from top of PWB (124-000321) four (4) Pal nuts fasteneing boards to shelf.

c) Raise upper manual as indicated in Step 2-8, and remove four (4) more Pal nuts fastening boards to shelf.

d) EXTREME CAUTION must be taken when unplugging and lifting and removing these large Printed Wiring Boards. Avoid damaging or breaking.

e) The same care must be taken when re-assembling.

2-20 REMOVAL OF PRINTED WIRING BOARDS

a) Other than the large Printed Wiring Boards on manual shelf, Step 2-19, removal of the remaining Printed Wiring Boards are obvious and will not be discussed.

2-21 TREMOLO ASSEMBLY (GAIN ACCESS TO)

a) From rear of organ, remove back, Step 2-2.
b) Remove two (2) hex wood screws from Tremolo Baffle Board Cleat.
c) From top and left of center of Tremolo Baffle Board, remove screw holding baffle to shelf bracket.
d) Tremolo will swing out for easy access. Tremolo Baffle will still be attached.

2-22 REVERBERATION ASSEMBLY (REMOVAL)

a) From rear of organ, remove back, Step 2-2.
b) Remove two screws from Reverb Unit brackets, fastening brackets to wood shelf.
c) Lift out.

2-23 PEDAL KEYBOARD ASSEMBLY (REMOVAL)

a) With back removed, Step 2-2, remove Reverberation Assembly Step 2-22.
b) Locate two (2) hex screws (each side) of Pedal Key Board, fastening pedal chassis to bottom wood shelf. Remove screws.
c) Lift rear of Pedal Assembly up, keeping front of assembly (pedal keys) down to clear bottom front of cabinet, lift out toward rear of organ.

2-24 AMPLIFIER (REMOVAL)

a) Remove back as in Step 2-2
b) From rear of organ locate the four (4) hex screws mounting Amplifier to bottom shelf. Remove screws.
c) Lift sliding Amplifier slightly to the left, and remove.

2-25 TO REMOVE SPEAKER

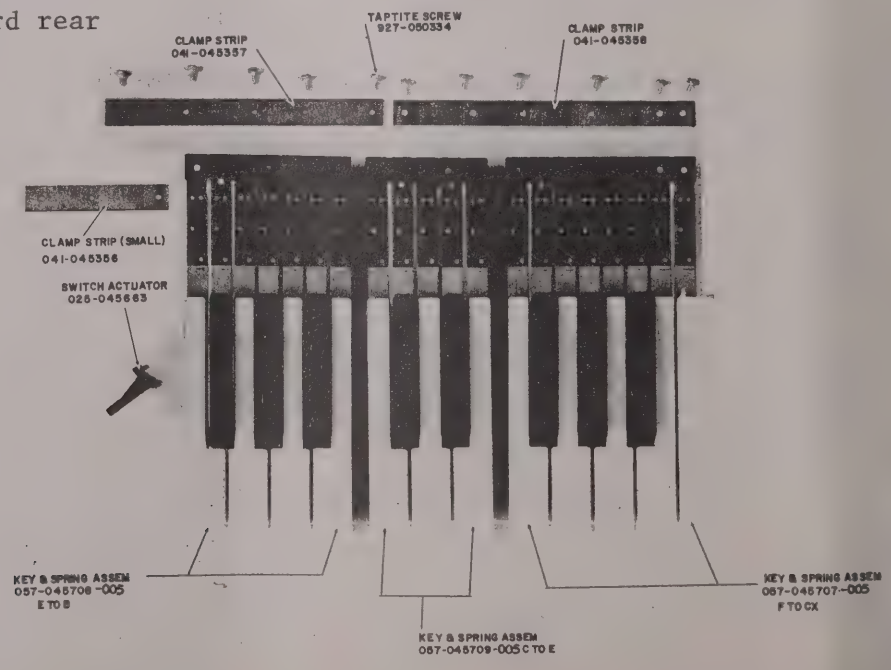
a) Loosen and remove pal nuts holding Speaker to Baffle.
b) Remove by sliding Speaker off studs.

2-26 REPLACE GRILLE CLOTH

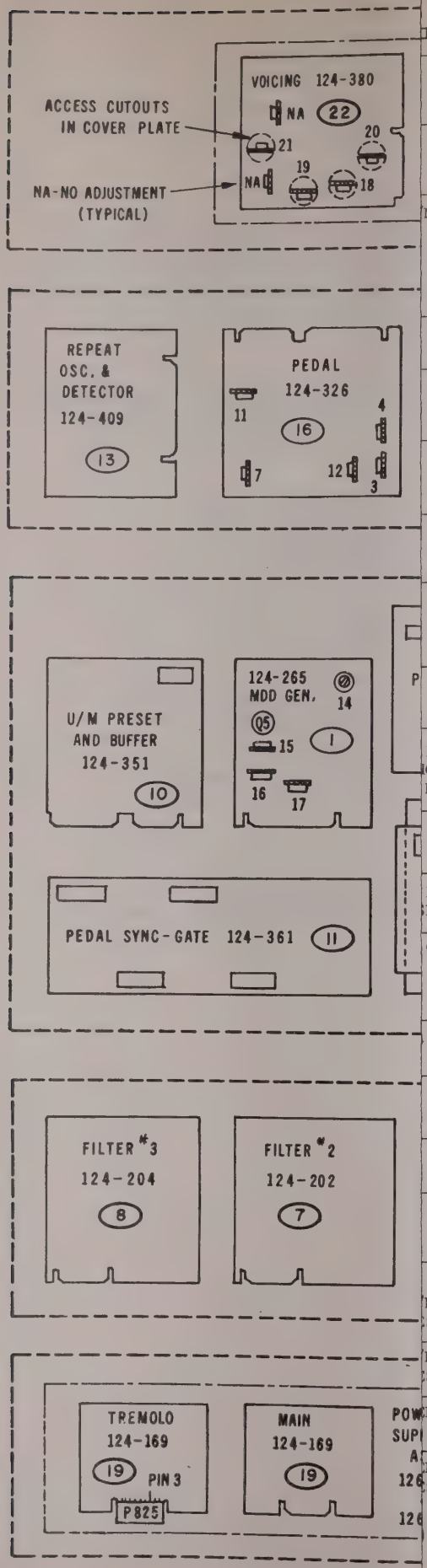
a) Grille Cloth is glued to card board backing, which is stapled to pressed wood baffle.
b) Remove Grille Cloth and backing by prying staples from baffle.
c) Replace by stapling.

2-27 KEY REPLACEMENT- Perform steps indicated in Step 2-8 or 2-15 first.

a) Keys can only be removed in sections, as shown in Illustration.
b) Determine which module is to be replaced. Remove screws and clamping strip associated with defective module.
c) Lift rear of module and carefully push forward separating actuator from contacts.
d) Replace with reverse procedure. Align actuators with contacts by viewing underside of keyboard during installation.



PHYSICAL LAYOUT O
TEST AND



	TEST POINT	CONTROL AND BOARD	SPEC. OR CONDITION
D	MAIN SPEAKER	124-377 MAIN ADJ. (18)	3.0V RMS
	WIPER OF POT AND GND. (2)	124-321 KEYER CUTOFF	-2.5V DC OR 0.5V DC BELOW "SING THRU"
M	AUDIBLE	124-326 ACC. NULL R101 (16)	ADJUST TO MIN. AUDIBLE THUMP
	MAIN SPEAKER	124-326 L/M Gain (16)	2.0V RMS
	P-825-3 & GND. ON POWER AMP.	124-377 LESLIE GAIN (18)	4.2V RMS
	MAIN SPEAKER	124-208 BRIGHT LEVEL (15)	2.0V RMS
	WIPER OF POT & GND. 124-326 (16)	124-326 PERC. CUTOFF POT.	0.5V BELOW "SING THRU"
		124-208 NULL (15)	ADJ. TO MIN. AUDIBLE THUMP IF NECESSARY
P	MAIN SPEAKER	124-208 PIANO SOLO LEVEL (15)	25V P-P
12, OLD DECAY	AUDIBLE	124-425 CUTOFF ADJ. (14)	ADJUST TO WHERE FEED THRU IS BARELY AUDIBLE
13	MAIN SPEAKER	124-326 PEDAL GAIN (16)	8.0 V RMS.
13 & E	MAIN SPEAKER	124-326 PEDAL DECAY (16)	800 MS (TIME)
9,10,	MAIN SPEAKER	124-166 LEVEL (20)	Q9V RMS.
TOP	MAIN SPEAKER	124-265 COIL (1)	4186 HZ. +4 HZ
	124-265 COLLECTOR OF Q5 (1)	124-265 VIB. WIDTH	6.0V P-P
	SAME AS 15 (1)	124-265 VIB. FREQ.	6.8 HZ
	SAME AS 15 (1)	124-265 VIB. DELAY	0.8 SEC.(TO 90% OF MAX. OSC.)
M KEY S/SEC.	MAIN SPEAKER	(22) 124-380 HIGH FREQ. ADJ.	3.0V RMS
M KEY S/SEC.	MAIN SPEAKER	124-380 BRUSH ADJ. (22)	2.5V RMS
DAL	MAIN SPEAKER	124-380 LO FREQ. ADJ. (22)	30V P-P
DAL S/SEC.	MAIN SPEAKER	124-380 CYMBAL ADJ. (22)	2.5V RMS

POT NUMBER" ON LAYOUT FOR ADJUSTMENT LOCATION.

2-20 REMOVAL OF PRINTED WIRING BOARDS

a) Other than the large Printed Wiring Boards on manual shelf, Step 2-19, removal of the remaining Printed Wiring Boards are obvious and will not be discussed.

2-21 TREMOLO ASSEMBLY (GAIN ACCESS TO)

a) From rear of organ, remove back, Step 2-2.
b) Remove two (2) hex wood screws from Tremolo Baffle Board Cleat.
c) From top and left of center of Tremolo Baffle Board, remove screw holding baffle to shelf bracket.
d) Tremolo will swing out for easy access. Tremolo Baffle will still be attached.

2-22 REVERBERATION ASSEMBLY (REMOVAL)

a) From rear of organ, remove back, Step 2-2.
b) Remove two screws from Reverb Unit brackets, fastening brackets to wood shelf.
c) Lift out.

2-23 PEDAL KEYBOARD ASSEMBLY (REMOVAL)

a) With back removed, Step 2-2, remove Reverberation Assembly Step 2-22.
b) Locate two (2) hex screws (each side) of Pedal Key Board, fastening pedal chassis to bottom wood shelf. Remove screws.
c) Lift rear of Pedal Assembly up, keeping front of assembly (pedal keys) down to clear bottom front of cabinet, lift out toward rear of organ.

2-24 AMPLIFIER (REMOVAL)

a) Remove back as in Step 2-2
b) From rear of organ locate the four (4) hex screws mounting Amplifier to bottom shelf. Remove screws.
c) Lift sliding Amplifier slightly to the left, and remove.

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a) Loosen and remove pal nuts holding Speaker to Baffle.
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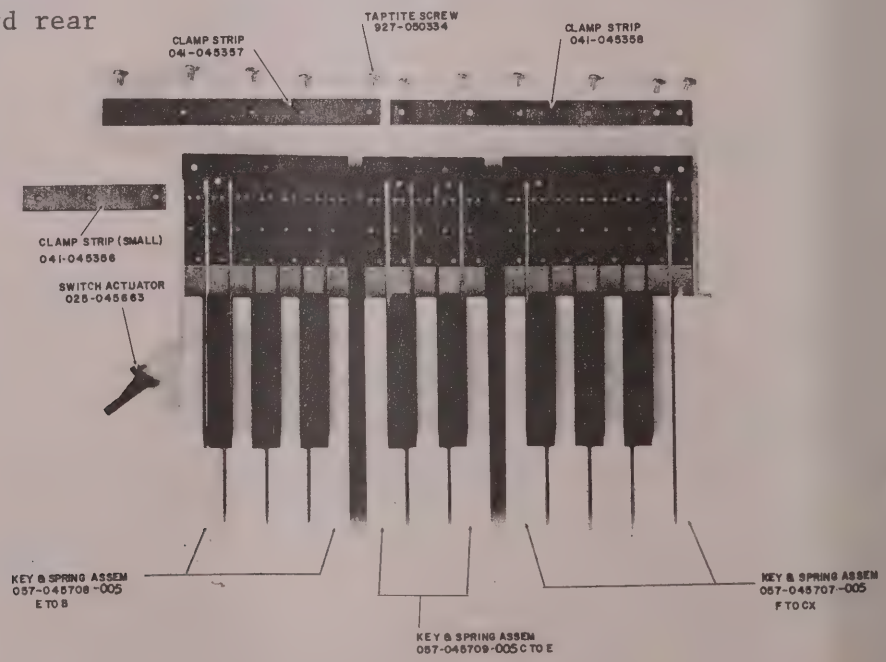
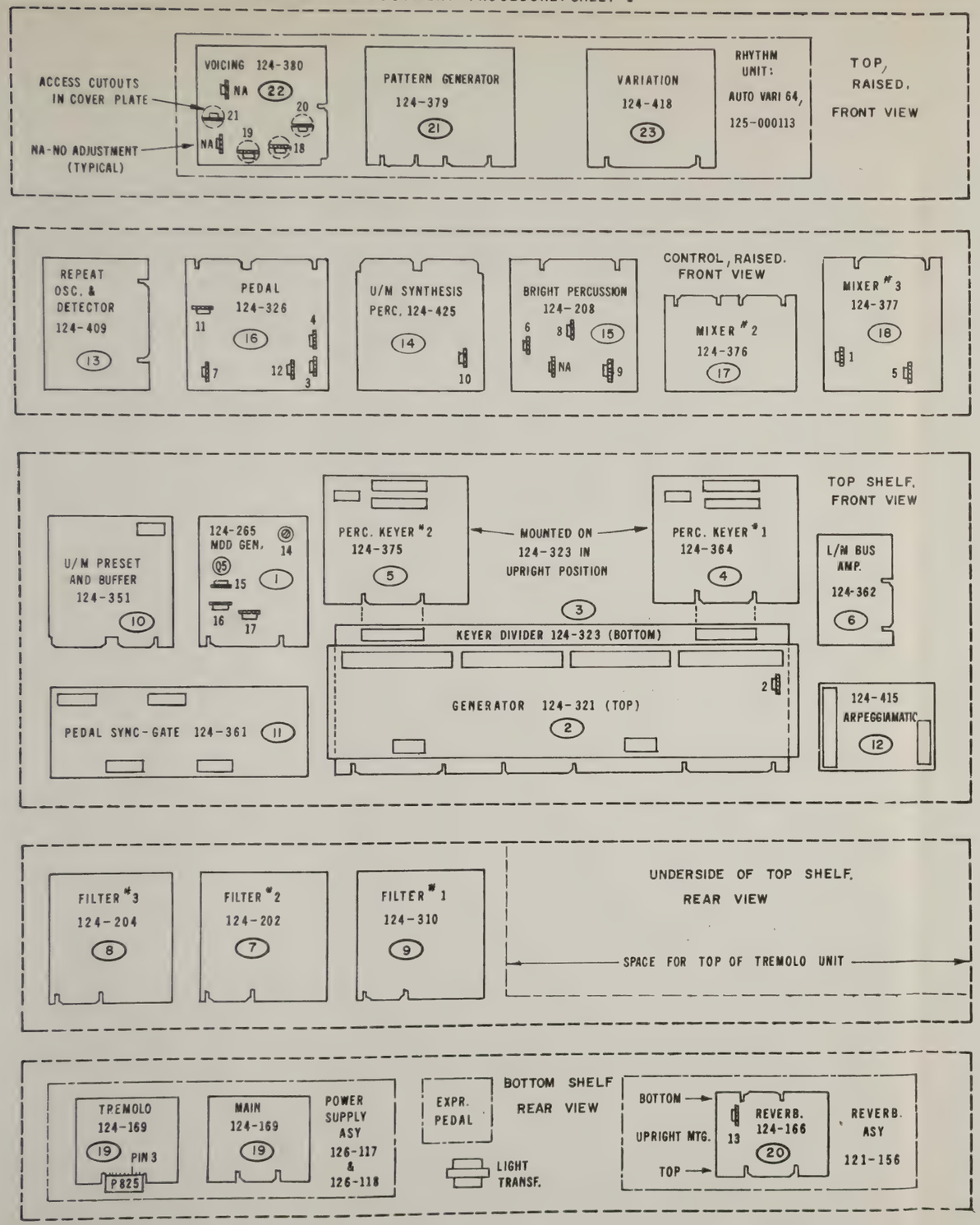
b) Remove Grille Cloth and backing by prying staples from baffle.
c) Replace by stapling.

2-27 KEY REPLACEMENT- Perform steps indicated in Step 2-8 or 2-15 first.

a) Keys can only be removed in sections, as shown in Illustration.
b) Determine which module is to be replaced. Remove screws and clamping strip associated with defective module.
c) Lift rear of module and carefully push forward separating actuator from contacts.
d) Replace with reverse procedure. Align actuators with contacts by viewing underside of keyboard during installation.



PHYSICAL LAYOUT OF 8200 SERIES SPINET ORGAN FOR TEST AND ADJUSTMENT PROCEDURE. SHEET 1



	TEST	SET UP PROCEDURE TABS AND TONEBAR SETTINGS	KEY(S) PRESSED	TEST POINT	CONTROL AND BOARD	SPEC. OR CONDITION
1.	MAIN CHANNEL LEVEL	PERC. TB PISTON, ALL 9 U/M TB's OUT, BRILLIANCE	U/M 8	MAIN SPEAKER	124-377 MAIN ADJ. (18)	3.0V RMS
2.	U/M CUT OFF	SAME AS 1	NONE	WIPER OF POT AND GND. (2)	124-321 KEYER CUTOFF	-2.5V DC OR 0.5V DC BELOW "SING THRU"
3.	A/A NULL (AUTO-VARI)	AUTO ACCOMP. SILENT/SOUND HARD ROCK, MEDIUM TEMPO, CONTINUOUS, VOL. @ MIN. VARIATION SWITCH OFF SELECT VARIATION A.	ANY L/M KEY	AUDIBLE	124-326 ACC. NULL R101 (16)	ADJUST TO MIN. AUDIBLE THUMP
4.	L/M LEVEL	BRILLIANCE ALL L/M TB'S OUT	L/M 8	MAIN SPEAKER	124-326 L/M Gain (16)	2.0V RMS
5.	TREMOLO CHANNEL	PERC. TB PISTON, ALL 9 U/M TB'S OUT, BRILLIANCE, TREMOLO ON UPPER	U/M 8	P-825-3 & GND. ON POWER AMP.	124-377 LESLIE GAIN (18)	4.2V RMS
6.	BRIGHT PERC. LEVEL	PERC. ONLY PISTON, REPEAT AT MAX. RATE PIZZ 1 & 2 BANJO, HARPSI, PIANO	U/M 8	MAIN SPEAKER	124-208 BRIGHT LEVEL (15)	2.0V RMS
7.	BRIGHT PERC. CUTOFF	SAME AS 6, TURN OFF REPEAT	NONE	WIPER OF POT & GND. 124-326 (16)	124-326 PERC. CUTOFF POT.	0.5V BELOW "SING THRU"
8.	BRIGHT REPEAT NULL	PERC. ONLY PISTON, REPEAT WITH RATE AT MIN.	U/M 8		124-208 NULL (15)	ADJ. TO MIN. AUDIBLE THUMP IF NECESSARY
9.	PIANO SOLO LEVEL	PIANO SOLO	U/M 8	MAIN SPEAKER	124-208 PIANO SOLO LEVEL (15)	25V P-P
10.	SYNTH. PERC. CUTOFF	PERC. ONLY PISTON, GLOCK, MARIMBA, XYLO., BRILLIANCE	U/M 8, 12, 15. HOLD UNTIL DECAY	AUDIBLE	124-425 CUTOFF ADJ. (14)	ADJUST TO WHERE FEED THRU IS BARELY AUDIBLE
11.	PEDAL LEVEL	PEDAL 8 & 16 TB'S	PEDAL 13	MAIN SPEAKER	124-326 PEDAL GAIN (16)	8.0 V RMS.
12.	PEDAL SUSTAIN	8' PEDAL TB., PEDAL SUSTAIN	PEDAL 13 & RELEASE	MAIN SPEAKER	124-326 PEDAL DECAY (16)	800 MS (TIME)
13.	REVERB	PERC. TB PISTON, TREMOLO ON UPPER, REVERB I, REVERB II, VIBRATO 2 UPPER TB'S SET AT 000607080	U/M 8,9,10, 11,12	MAIN SPEAKER	124-166 LEVEL (20)	Q9V RMS.
14.	TUNING	PERC. TB PISTON, U/M 4' TB	U/M 44 TOP "C"	MAIN SPEAKER	124-265 COIL (1)	4186 HZ. ±4 HZ
15.	VIB. WIDTH	VIB. 2, U/M 8' TB OUT, TB AND PERC. PISTON	U/M 8	124-265 COLLECTOR OF Q5 (1)	124-265 VIB. WIDTH	6.0V P-P
16.	VIB. FREQ.	SAME AS 15	U/M 8	SAME AS 15 (1)	124-265 VIB. FREQ.	6.8 HZ
17.	VIB. DELAY	SAME AS 15 DELAY VIB. ON	U/M 8	SAME AS 15 (1)	124-265 VIB. DELAY	0.8 SEC. (TO 90% OF MAX. OSC.)
	AUTO VARI				(22)	
18.	HIGH FREQ. LEVEL	SNARE DRUM LOWER SWITCH ON, RHYTHM VOLUME TO MAX.	ANY L/M KEY 5 TIMES/SEC.	MAIN SPEAKER	124-380 HIGH FREQ. ADJ.	3.0V RMS
19.	BRUSH LEVEL	BRUSH LOWER SWITCH ON	ANY L/M KEY 5 TIMES/SEC.	MAIN SPEAKER	124-380 BRUSH ADJ (22)	2.5V RMS
20.	LOW FREQ. LEVEL	BASS DRUM PEDAL SWITCH ON	ANY PEDAL	MAIN SPEAKER	124-380 LO FREQ. ADJ (22)	30V P-P
21.	CYMBAL LEVEL	CYMBAL PEDAL SWITCH ON	ANY PEDAL 5 TIMES/SEC.	MAIN SPEAKER	124-380 CYMBAL ADJ. (22)	2.5V RMS

NOTE: DURING TEST REFER TO "FOOTBALL AND POT NUMBER" ON LAYOUT FOR ADJUSTMENT LOCATION.

SERVICE HINTS

RADIO OR TELEVISION INTERFERENCE

During the design stage of Hammond Organ Products, the reception and transmission properties of individual circuits are analyzed and tested within reasonable ranges. There are several circuits which have been modified to reduce the effects of radio frequencies (RF) as a result of these tests.

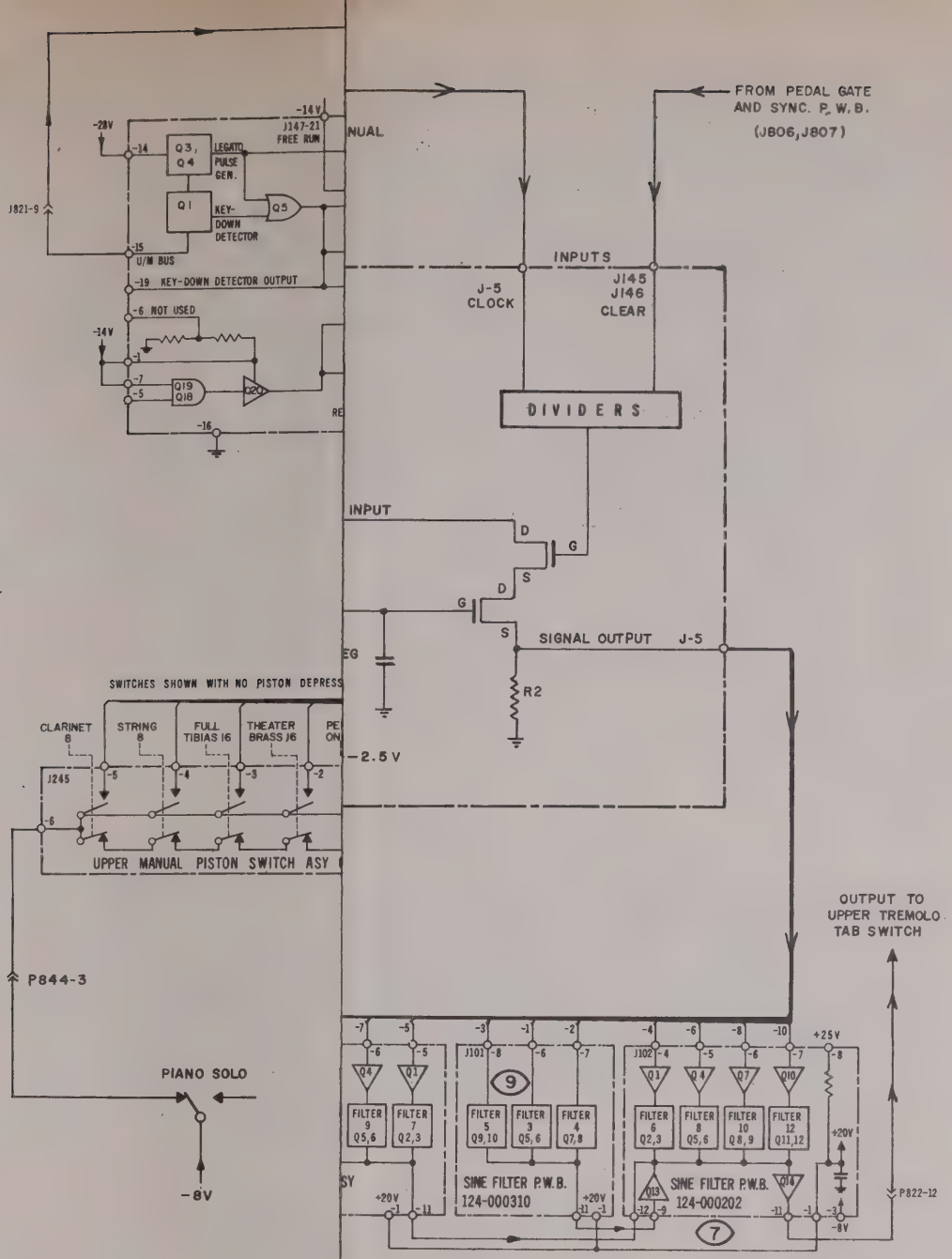
In the event a situation occurs that results in regular and consistent interference by or from RF transmissions, the following suggestions would be recommended.

1. Attempt to determine the source of the RF transmission. (CB Operator, Amateur Radio Operator, Ham Operator, AM or FM Radio Station, Etc.)

2. Determine the specific organ circuit(s) which are allowing the RF signal to become rectified and amplified.

3. Generally the RF signals can be suppressed by the installation of suppression components such as by-pass capacitors in appropriate locations. Series filter circuits have also been successful in some cases.

4. In cases of persistent problems, contact the Hammond Technical Service Department for further suggestions and assistance.


FROM PEDAL GATE AND SYNC. P.W.B. (J806,J807)
-14V
J147-21 FREE RUN
NUAL
-28V
-14
Q3, Q4
LEGATO PULSE GEN.
Q1
KEY-DOWN DETECTOR
Q5
J821-9
-15
U/M BUS
-19 KEY-DOWN DETECTOR OUTPUT
-6 NOT USED
-14V
-1
-7
-5
Q19 Q18
Q20
-16
INPUTS
J-5 CLOCK
J145 J146 CLEAR
DIVIDERS
INPUT
D
G
S
D
G
S
SIGNAL OUTPUT J-5
R2
EG
-2.5 V
SWITCHES SHOWN WITH NO PISTON DEPRESS
CLARINET 8
STRING 8
FULL TIBIAS 16
THEATER BRASS 16
J245
-5
-4
-3
-2
-6
UPPER MANUAL PISTON SWITCH ASY
OUTPUT TO UPPER TREMOLO TAB SWITCH
P844-3
PIANO SOLO
-8V
-7
-5
-6
-5
Q4
Q1
FILTER 9 Q5,6
FILTER 7 Q2,3
+20V
-1
-11
SY
-3
-1
-2
J101
-8
-6
-7
9
FILTER 5 Q9,10
FILTER 3 Q5,6
FILTER 4 Q7,8
SINE FILTER P.W.B. 124-000310
+20V
-11
-1
-4
-6
-8
-10
+25V
J102
-4
-5
-6
-7
-8
Q3
Q4
Q7
Q10
FILTER 6 Q2,3
FILTER 8 Q5,6
FILTER 10 Q8,9
FILTER 12 Q11,12
+20V
Q13
SINE FILTER P.W.B. 124-000202
Q14
-12
-9
-11
-1
-3
-8V
7
P822-12

2-47 CLEANING

PLASTIC KEYS AND CONTROL TABS

Clean plastic keys and control tablets lightly with a soft, damp cloth or chamois. Wiping with a dry cloth builds up an electrostatic charge which will attract dust particles from the air. If cleaning agents are necessary, use pure facial soap and lukewarm water. Dry without excessive rubbing. Do not use boiling water, strong solvents such as alcohol, dry cleaning fluids, or window cleaning fluids which contain such solvents.

WOODWORK

Clean and dust the woodwork with a soft, damp cloth or chamois. If cleaning agents are necessary, use a soft cloth lightly dampened with a solution of mild soap and lukewarm water. Remove solution, using soft cloth dampened with clean water. Dry thoroughly, rubbing with the grain. Use a good grade liquid furniture wax or polish. Avoid use of paste waxes or oil type polishes. Excessive rubbing in one spot or at edges may result in damage to the finish.

MOVING OR SHIPPING

Arrange to have your organ properly packed by your Hammond Organ dealer if not be a regular furniture mover. Don't risk damage to the instrument by letting inexperienced movers handle it.

LOCATION OF CONSOLE

The back of the console should be at least two inches from the wall for ventilation and for the best acoustic results.

SERVICE

PRODUCT SERVICE

For product service, contact nearest authorized Hammond Service Center or write to: Manager, Product Service, Hammond Organ Company, 4200 West Diversey Avenue, Chicago, Illinois 60639.

PARTS ARE ALSO AVAILABLE BY CONTACTING PRODUCT SERVICE AS MENTIONED ABOVE.

IMPORTANT:

ALWAYS SUPPLY MODEL DESIGNATION AND SERIAL NUMBER WHEN WRITING.

RADIO OR TELEVISION INTERFERENCE

During the design stage of Hammond Organ Products, the reception and transmission properties of individual circuits are analyzed and tested within reasonable ranges. There are several circuits which have been modified to reduce the effects of radio frequencies (RF) as a result of these tests.

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2. Determine the specific organ circuit(s) which are allowing the RF signal to become rectified and amplified.

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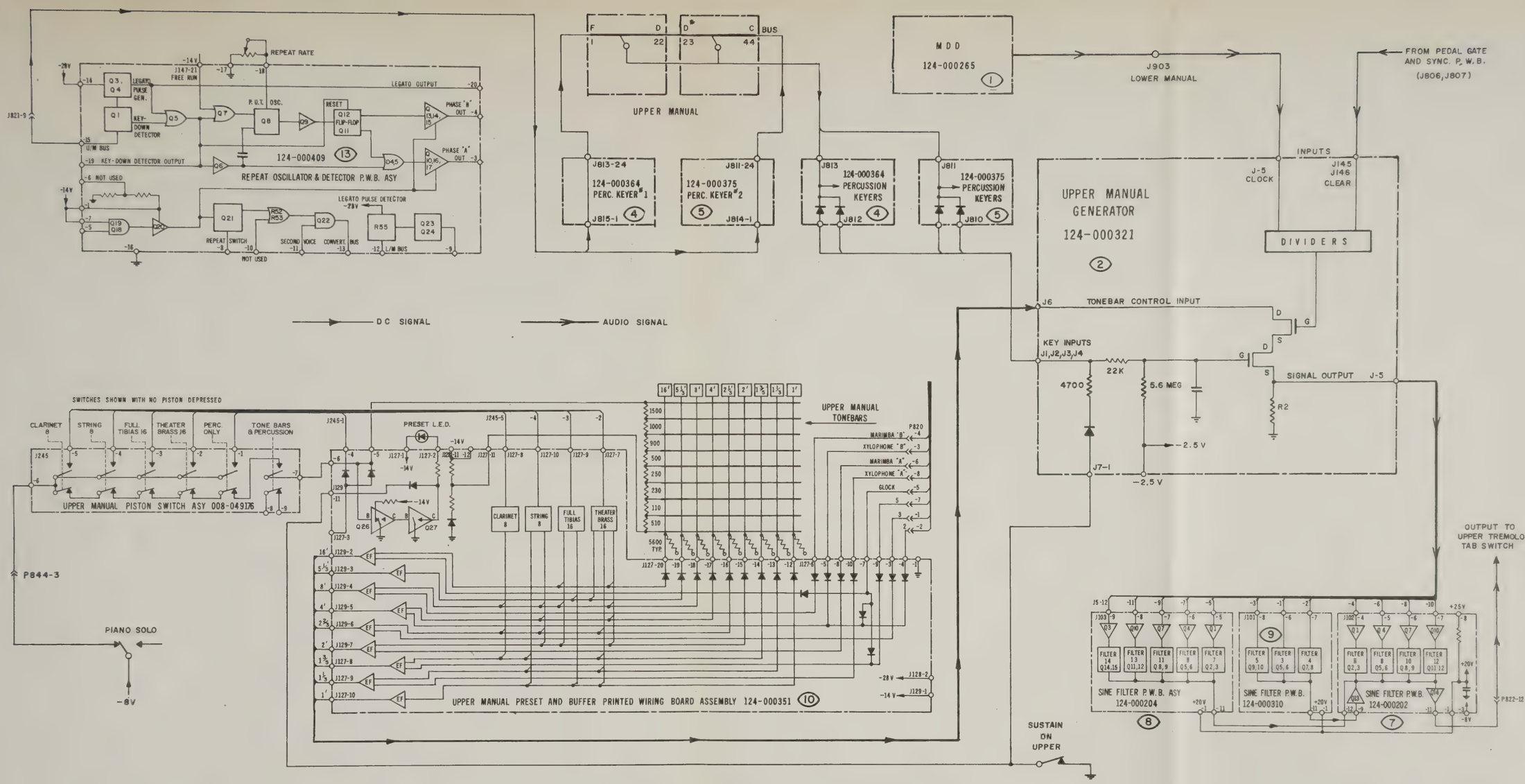
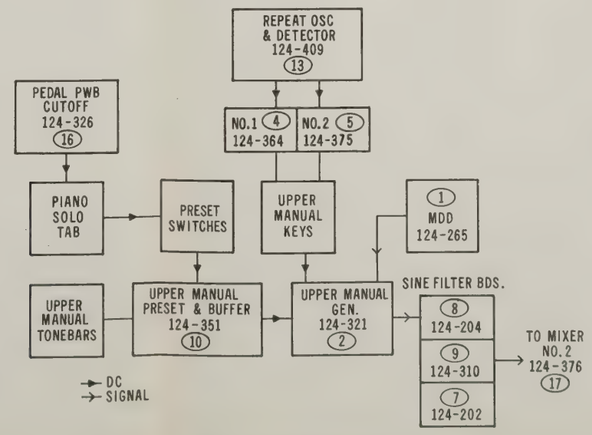
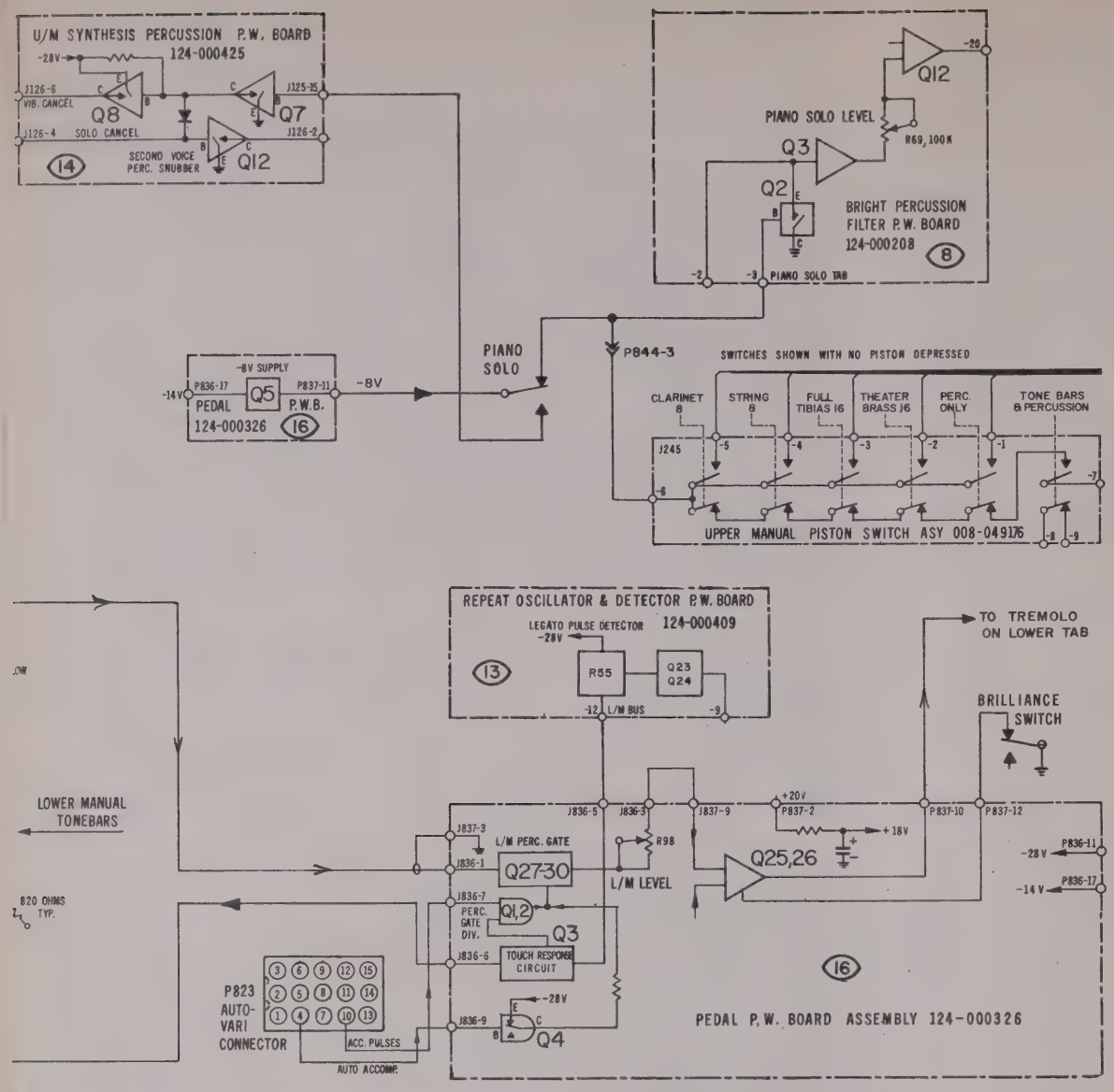


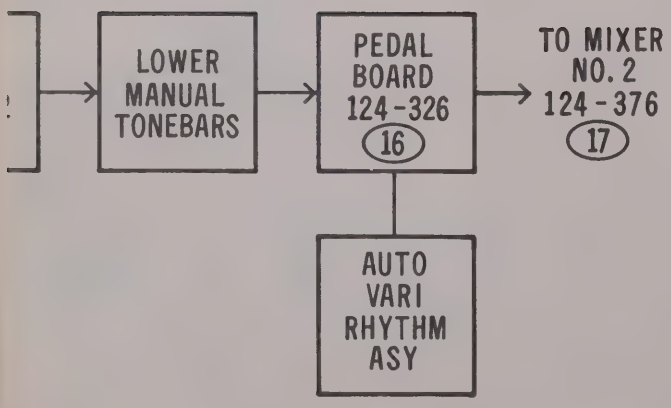
UPPER TONEBARS AND PRESETS

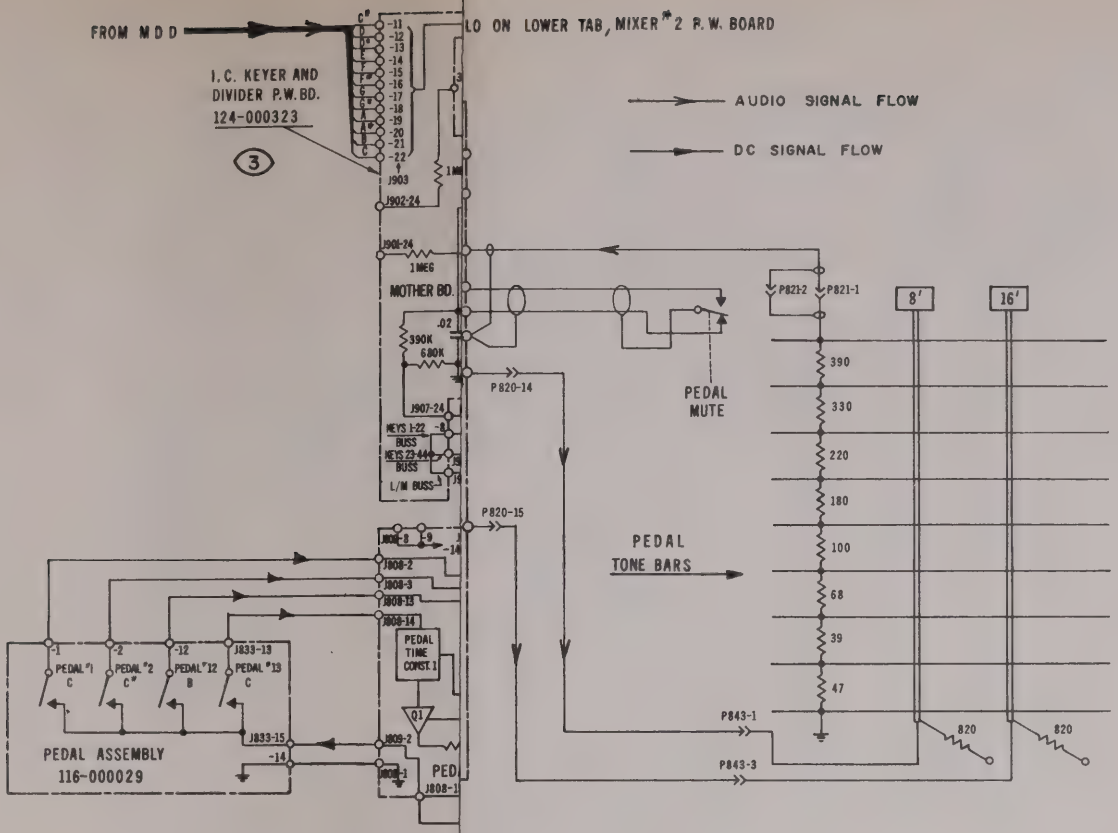


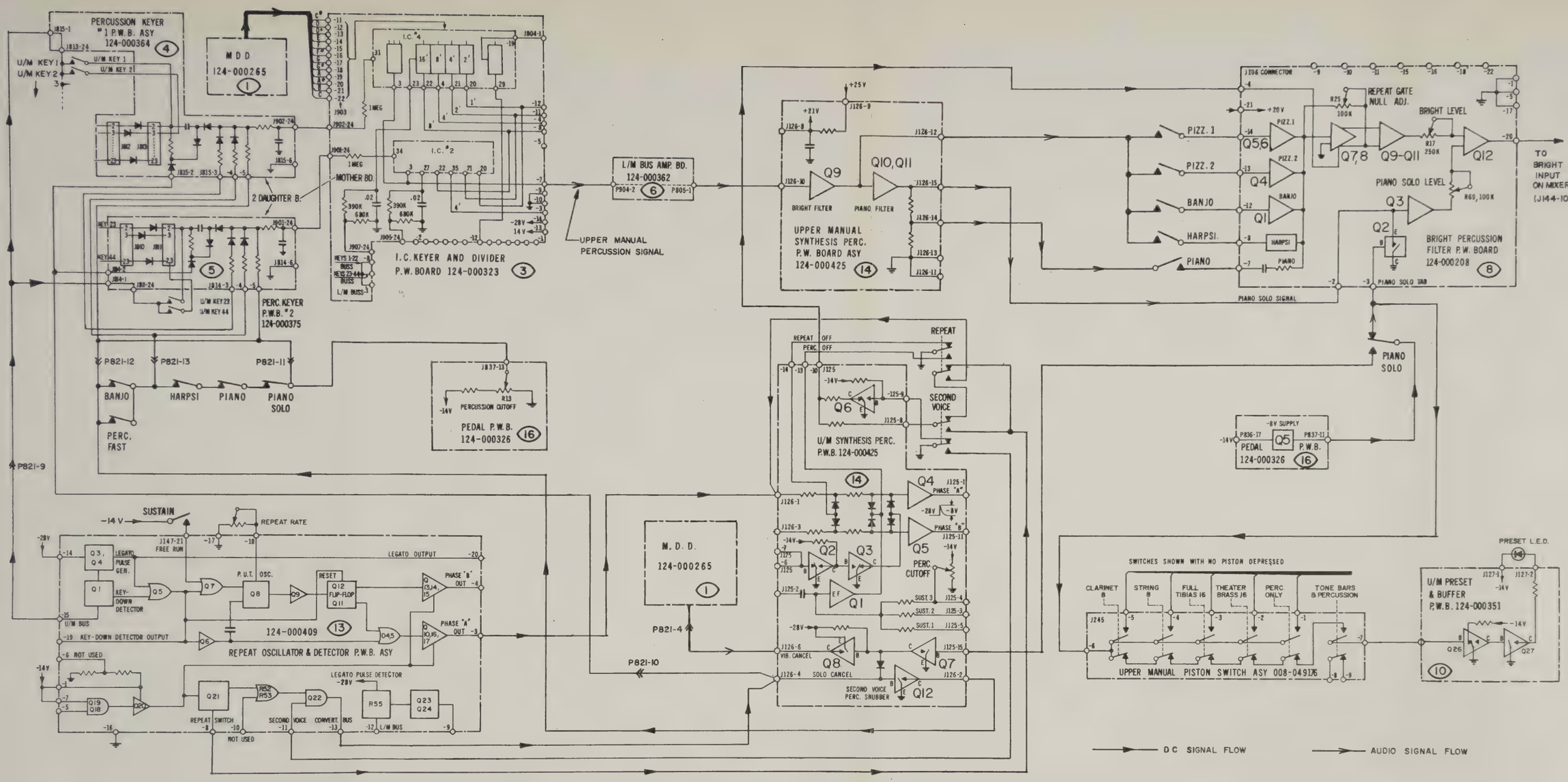
UPPER TONEBAR & PRESETS


U/M SYNTHESIS PERCUSSION P.W. BOARD
124-000425
-28V
J126-6
VIB. CANCEL
J126-4
SOLO CANCEL
Q8
Q7
Q12
J125-15
J126-2
SECOND VOICE
PERC. SNUBBER
14
Q12
-20
PIANO SOLO LEVEL
R69, 100K
Q3
Q2
BRIGHT PERCUSSION
FILTER P.W. BOARD
124-000208
8
-2
-3
PIANO SOLO TAB
-8V SUPPLY
-14V
P836-17
P837-11
-8V
PEDAL
P.W.B.
124-000326
16
Q5
PIANO
SOLO
P844-3
SWITCHES SHOWN WITH NO PISTON DEPRESSED
CLARINET
8
STRING
8
FULL
TIBIAS 16
THEATER
BRASS 16
PERC.
ONLY
TONE BARS
& PERCUSSION
J245
UPPER MANUAL PISTON SWITCH ASY 008-049176
REPEAT OSCILLATOR & DETECTOR P.W. BOARD
LEGATO PULSE DETECTOR
-28V
124-000409
13
R55
Q23
Q24
-12
L/M BUS
-9
TO TREMOLO
ON LOWER TAB
BRILLIANCE
SWITCH
LOWER MANUAL
TONEBARS
J836-5
J836-3
J837-9
+20V
P837-2
P837-10
P837-12
J837-3
L/M PERC. GATE
J836-1
Q27-30
R98
L/M LEVEL
Q25,26
+18V
P836-11
-28V
P836-17
-14V
820 OHMS
TYP.
J836-7
PERC.
GATE
DIV.
Q1,2
Q3
J836-6
TOUCH RESPONSE
CIRCUIT
16
P823
AUTO-
VARI
CONNECTOR
ACC. PULSES
AUTO ACCOMP.
J836-9
-28V
Q4
PEDAL P.W. BOARD ASSEMBLY 124-000326

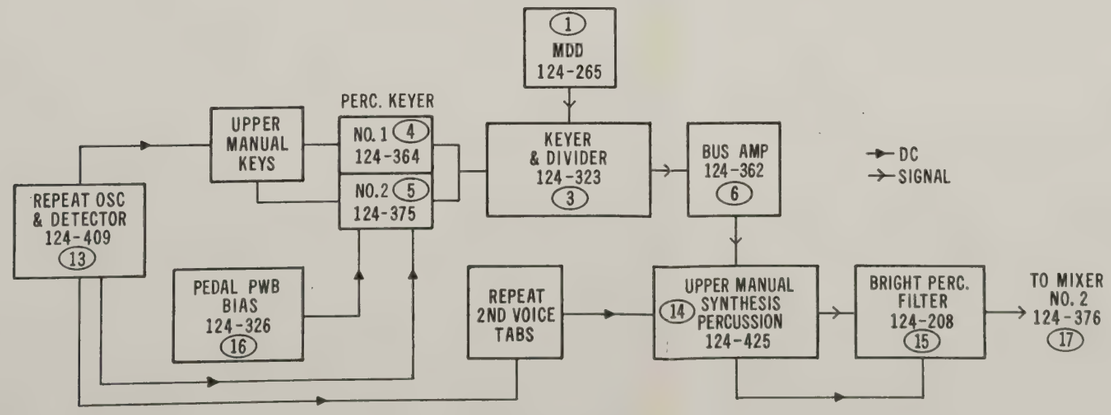
O CONTROL


LOWER
MANUAL
TONEBARS
PEDAL
BOARD
124-326
16
TO MIXER
NO. 2
124-376
17
AUTO
VARI
RHYTHM
ASY

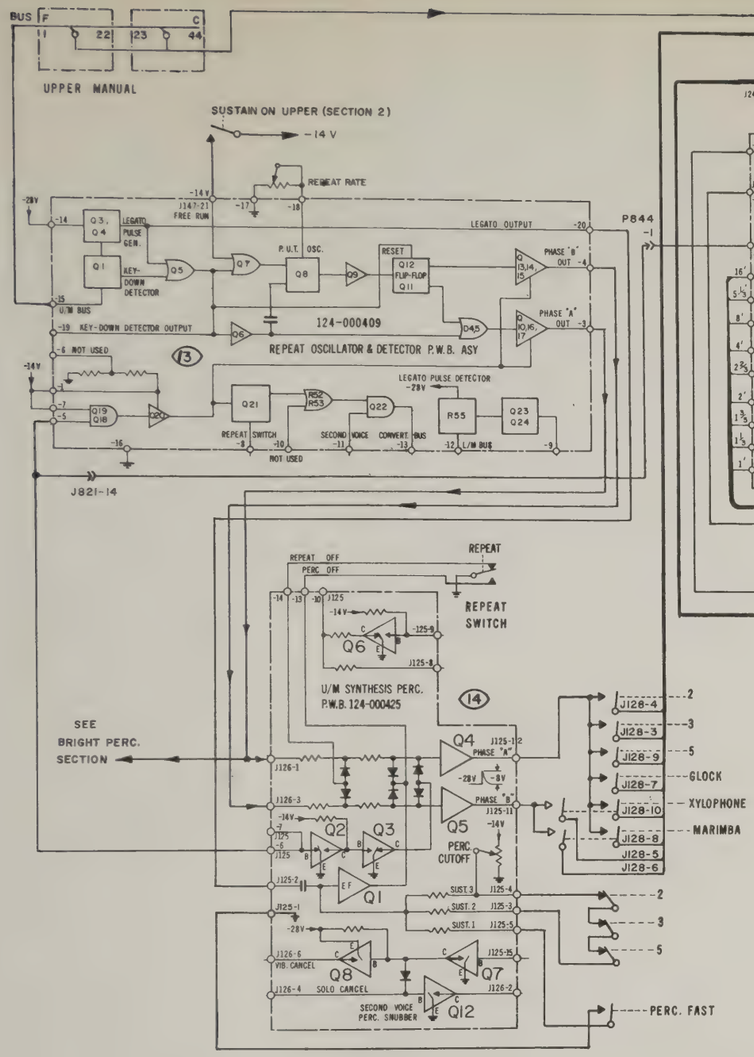

FROM M D D
LO ON LOWER TAB, MIXER #2 P.W. BOARD
I.C. KEYER AND DIVIDER P.W.BD. 124-000323
3
AUDIO SIGNAL FLOW
DC SIGNAL FLOW
J903
1MEG
J902-24
J901-24
1 MEG
MOTHER BD.
.02
390K
680K
J907-24
KEYS 1-22 BUSS
KEYS 23-44 BUSS
L/M BUSS
P820-14
PEDAL MUTE
P821-2
P821-1
8'
16'
390
330
220
180
100
68
39
47
P820-15
PEDAL TONE BARS
J808-8
J808-2
J808-3
J808-13
J808-14
PEDAL TIME CONST.1
Q1
J809-2
J808-1
PED
P843-1
P843-3
820
820
PEDAL #1 C
PEDAL #2 C#
PEDAL #12 B
PEDAL #13 C
J833-13
J833-15
PEDAL ASSEMBLY 116-000029

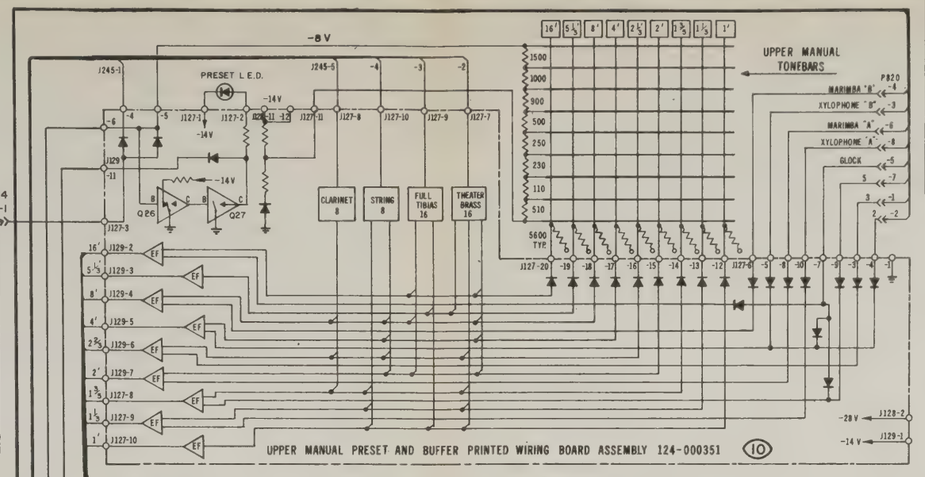


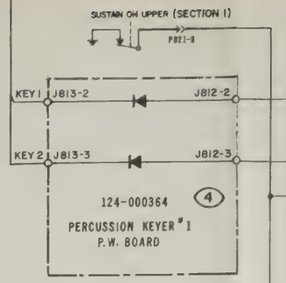
BRIGHT PERCUSSION SYSTEM

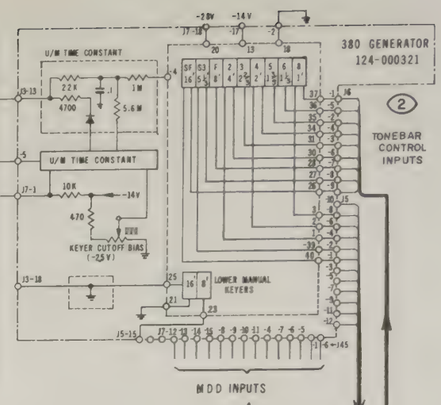


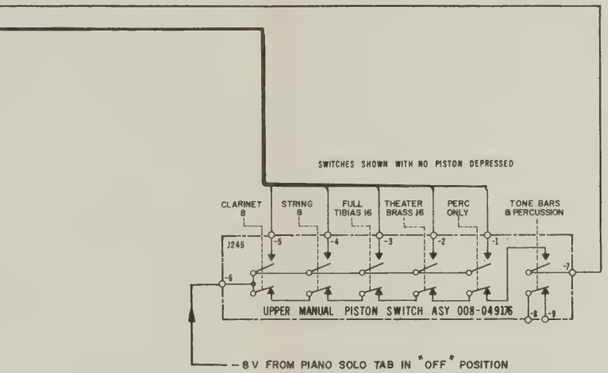
BRIGHT PERCUSSION

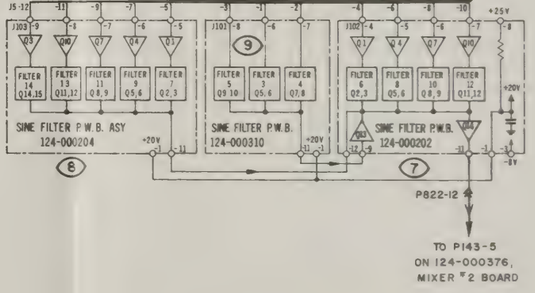









SWITCHES SHOWN WITH NO PISTON DEPRESSED
CLARINET 8
STRING 8
FULL TIBIAS 16
THEATER BRASS 16
PERC ONLY
TONE BARS & PERCUSSION
UPPER MANUAL PISTON SWITCH ASY 008-049176
-8 V FROM PIANO SOLO TAB IN "OFF" POSITION

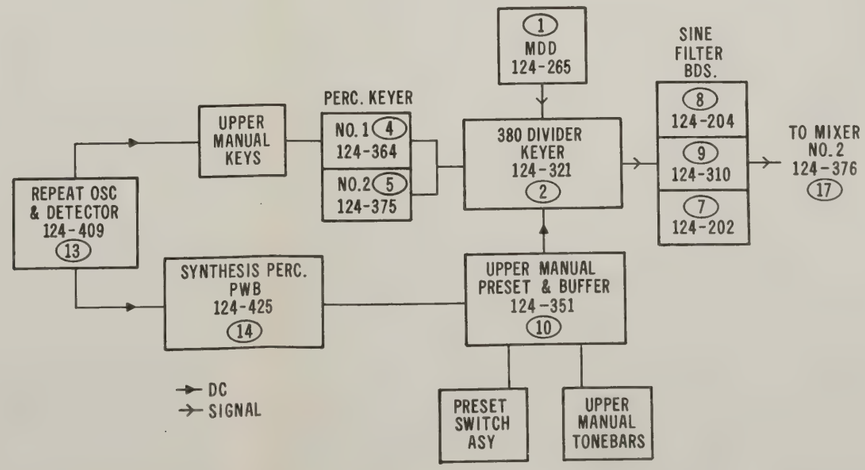

SINE FILTER P.W.B. ASY 124-000204
SINE FILTER P.W.B. 124-000310
SINE FILTER P.W.B. 124-000202
P822-12
TO P143-5 ON 124-000376, MIXER #2 BOARD

DC SIGNAL FLOW

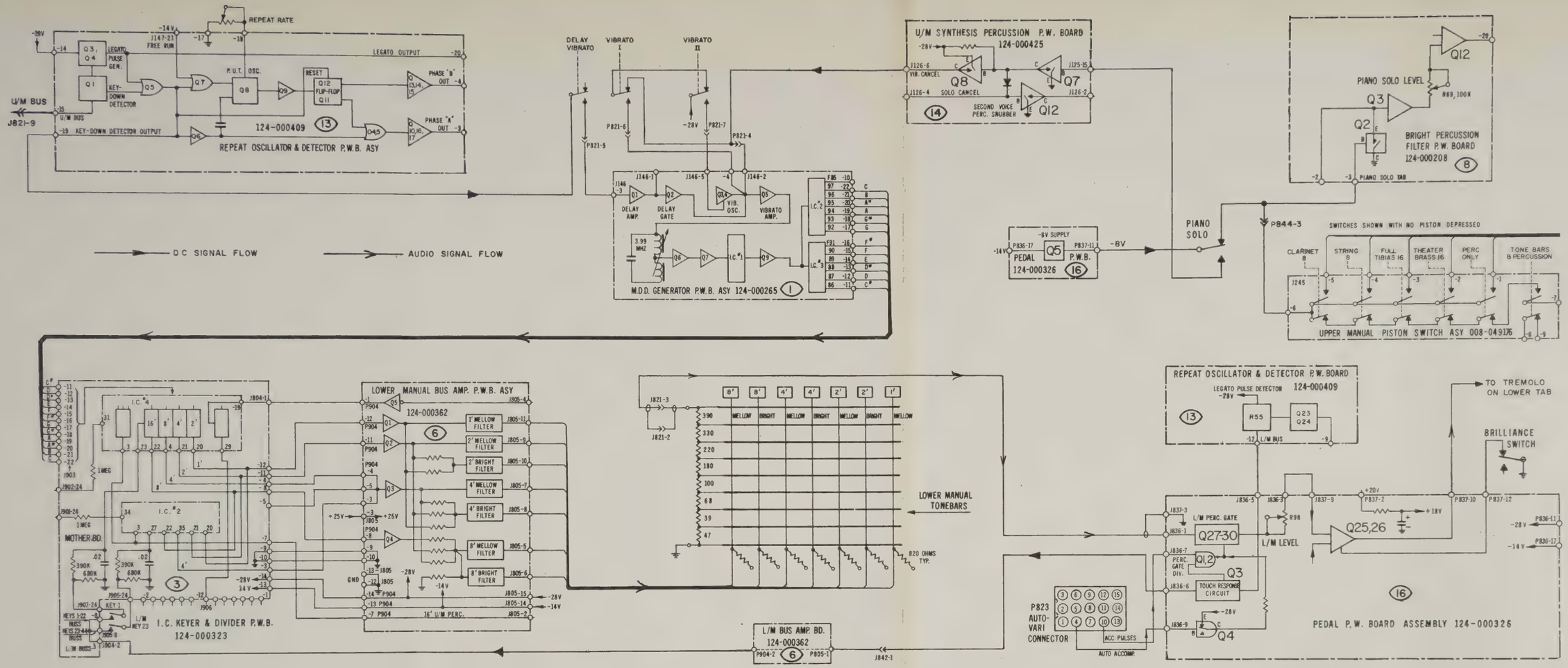
AUDIO SIGNAL FLOW

MDD P.W. BOARD 124-000265 (1)

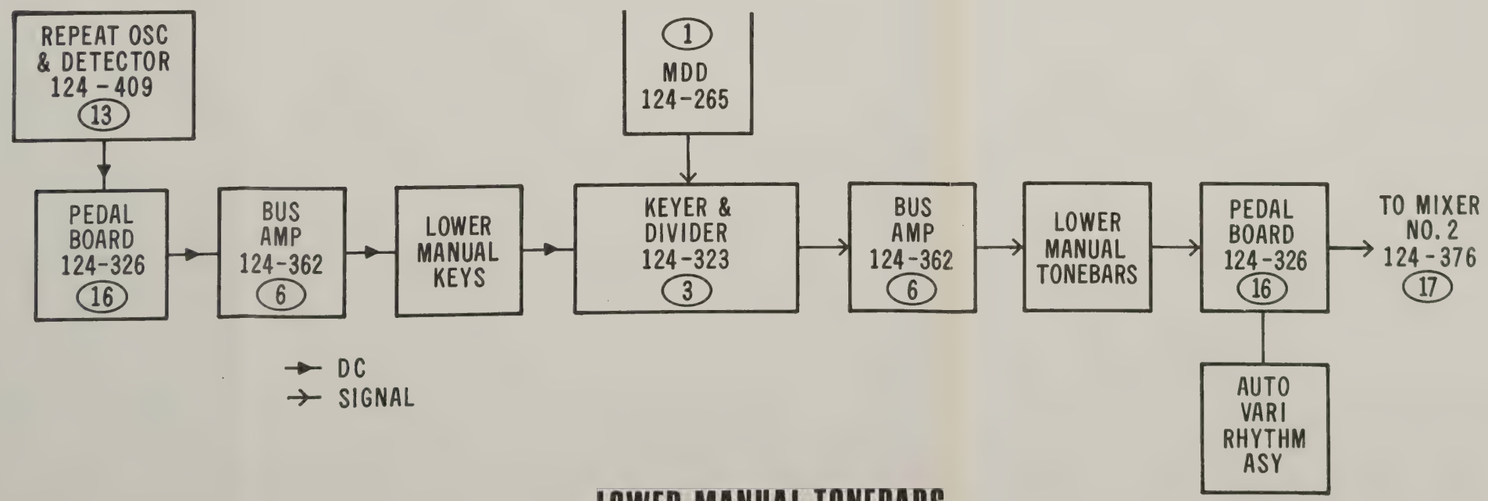
UPPER SYNTHESIS PERCUSSION



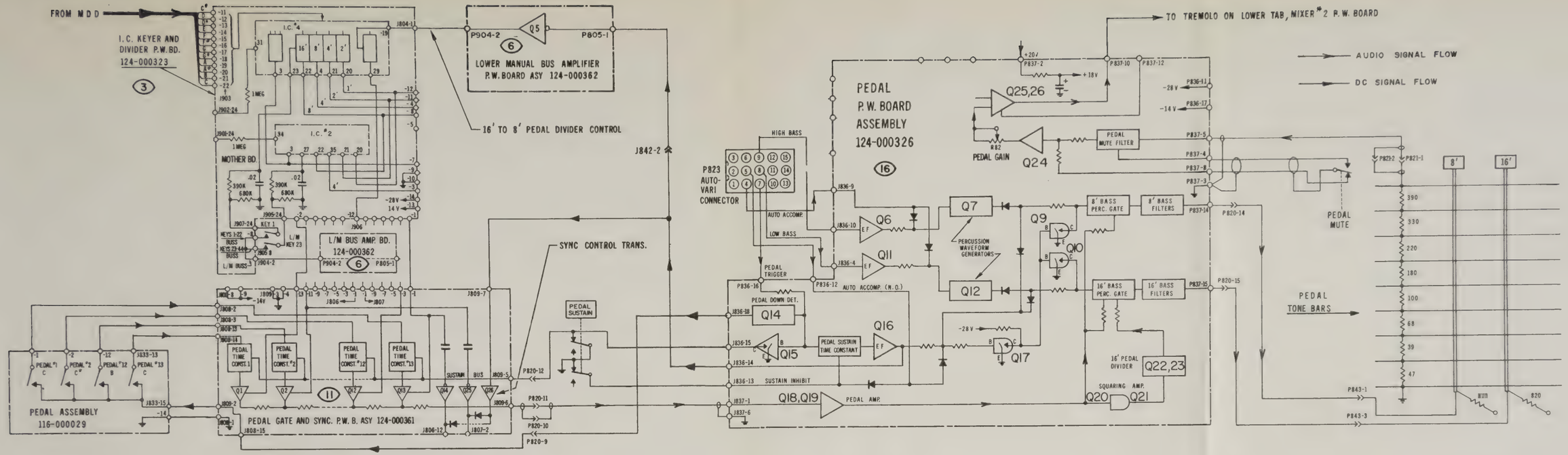
UPPER SYNTHESIS PERCUSSION

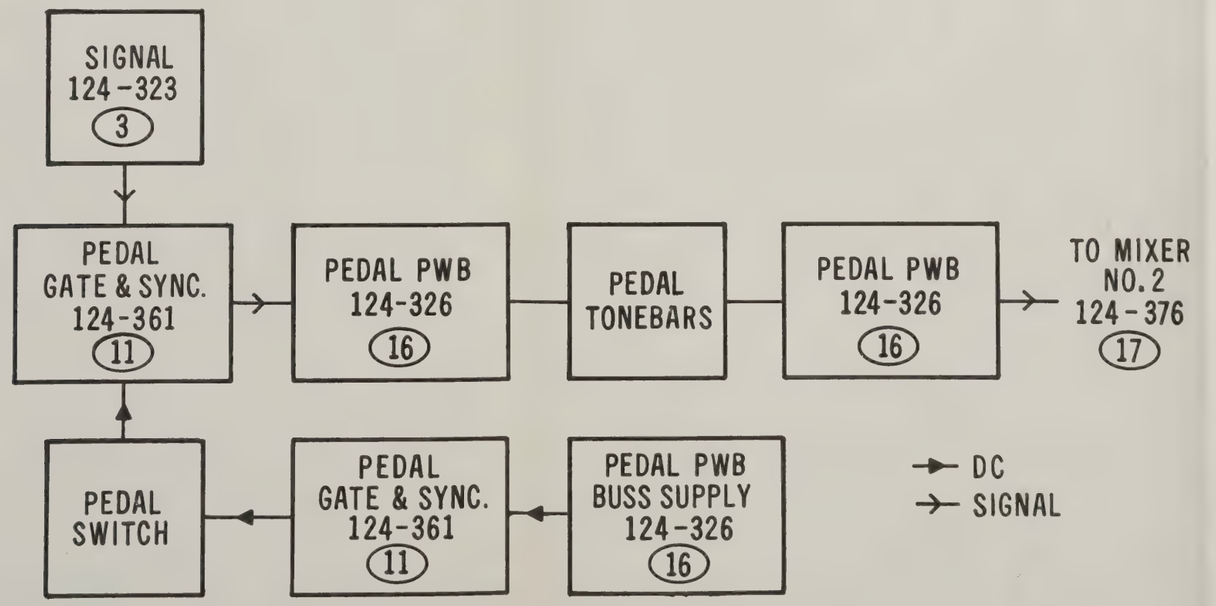


LOWER TONEBARS AND VIBRATO CONTROL

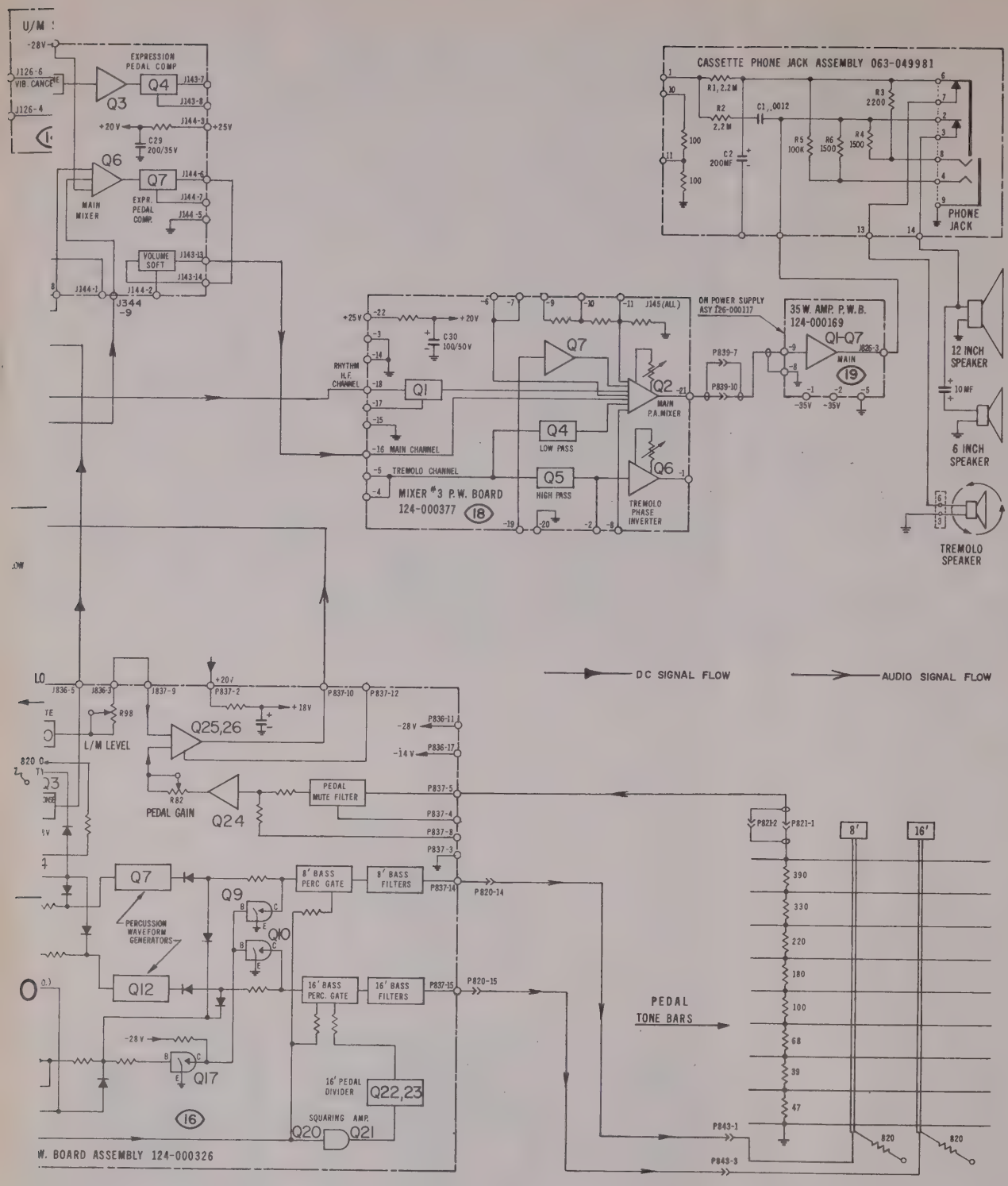


LOWER MANUAL TONEBARS

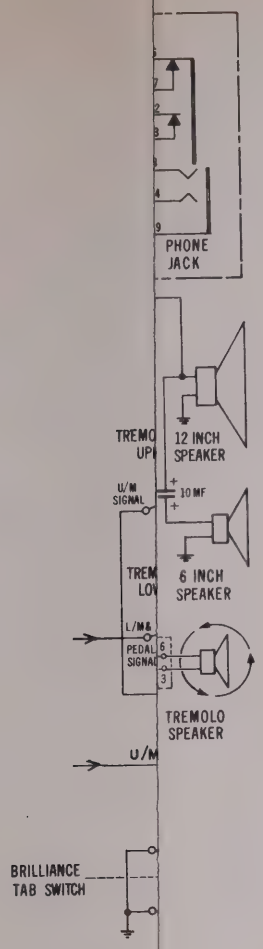


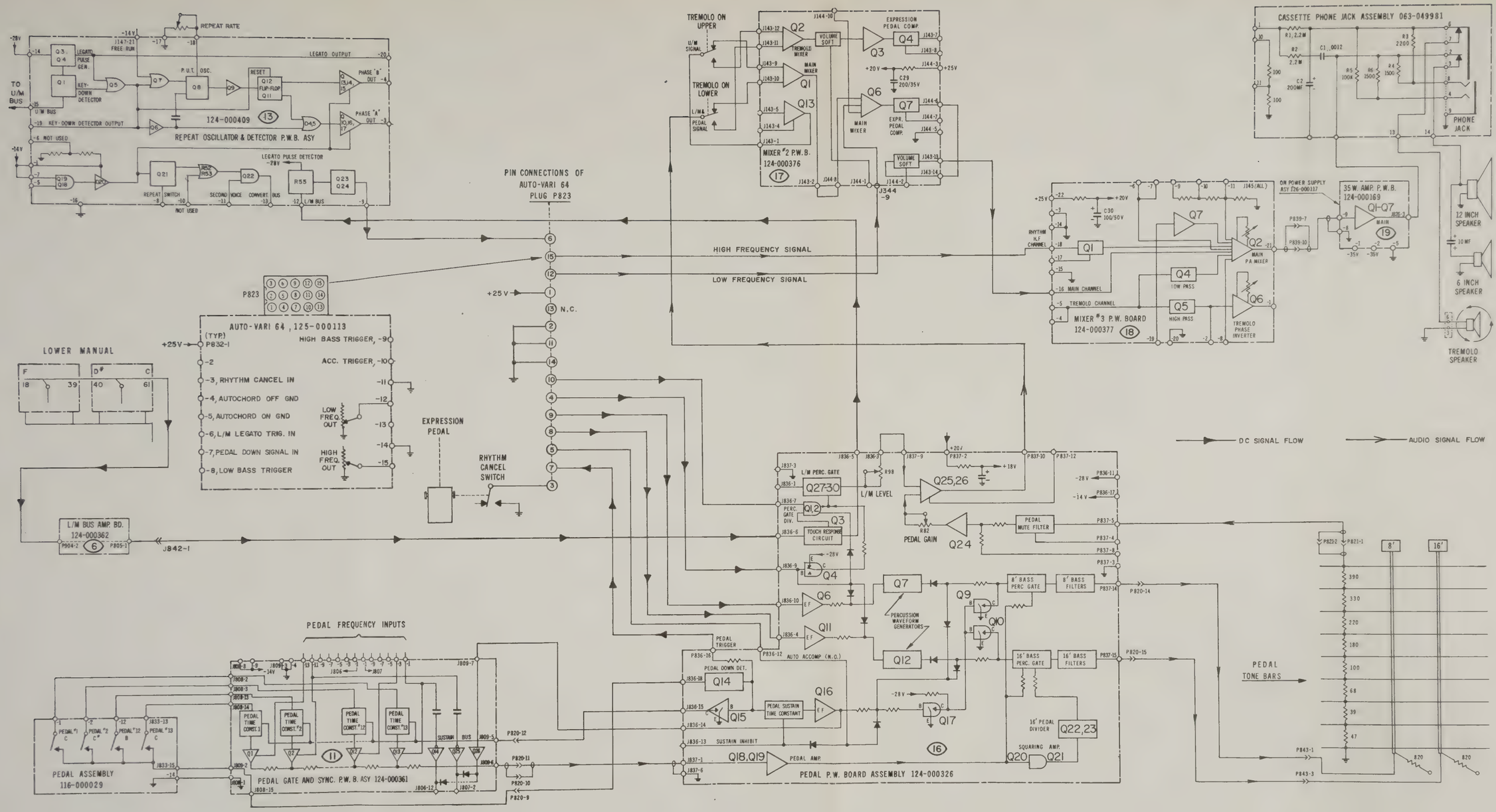


PEDAL TONEBARS

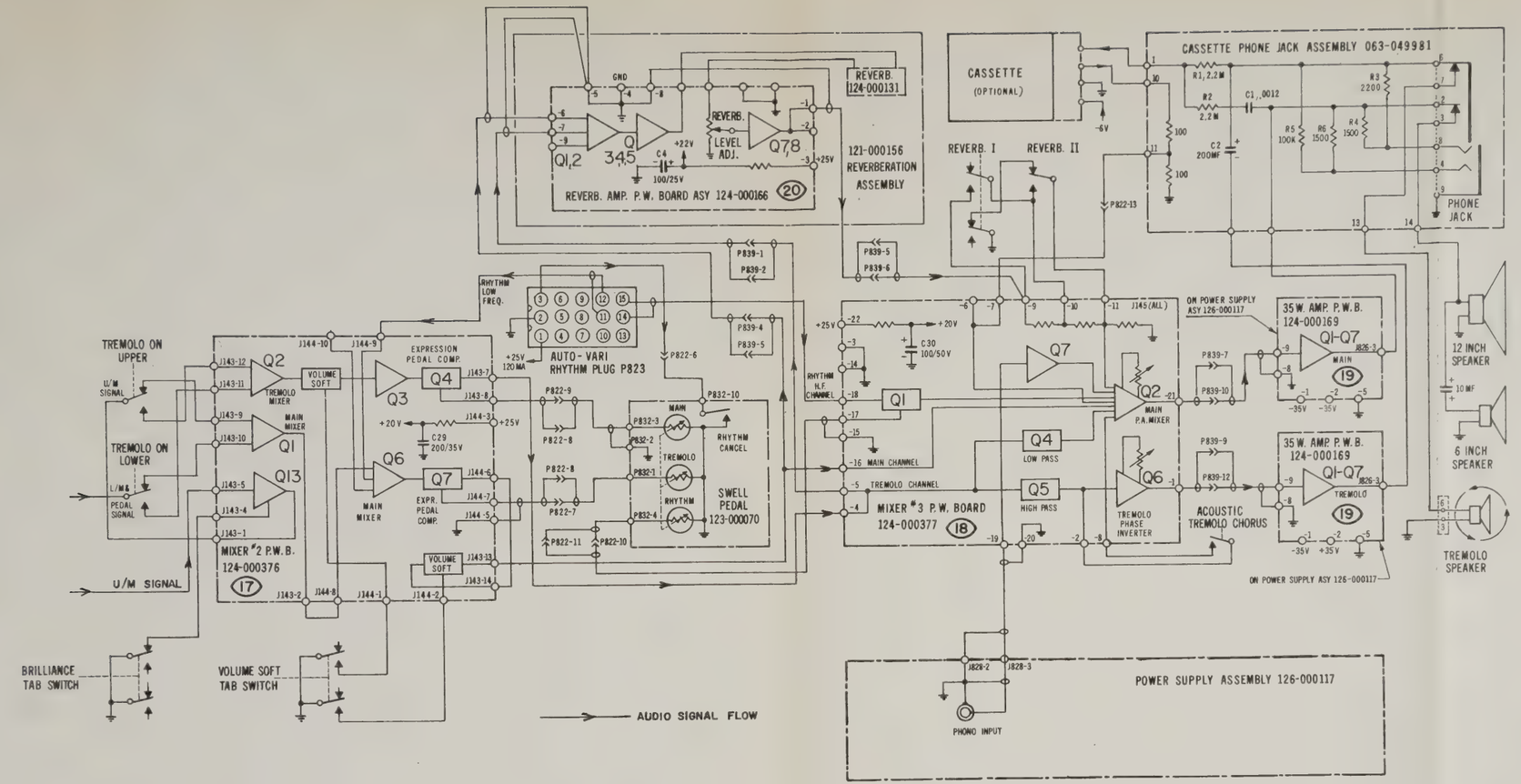

CASSETTE PHONE JACK ASSEMBLY 063-049981
PHONE JACK
EXPRESSION PEDAL COMP
Q4
Q3
Q6
Q7
MAIN MIXER
EXPR. PEDAL COMP.
VOLUME SOFT
J344 -9
MIXER #3 P.W. BOARD 124-000377
18
RHYTHM H.F. CHANNEL
MAIN CHANNEL
TREMOLO CHANNEL
Q1
Q2
MAIN P.A. MIXER
Q4
LOW PASS
Q5
HIGH PASS
Q6
TREMOLO PHASE INVERTER
OH POWER SUPPLY ASY 126-000117
35 W. AMP. P.W.B. 124-000169
Q1-Q7
MAIN
19
12 INCH SPEAKER
6 INCH SPEAKER
TREMOLO SPEAKER
DC SIGNAL FLOW
AUDIO SIGNAL FLOW
L/M LEVEL
Q25,26
PEDAL GAIN
Q24
PEDAL MUTE FILTER
8' BASS PERC GATE
8' BASS FILTERS
16' BASS PERC. GATE
16' BASS FILTERS
PERCUSSION WAVEFORM GENERATORS
Q7
Q9
Q10
Q12
Q17
16' PEDAL DIVIDER
Q22,23
SQUARING AMP.
Q20
Q21
16
W. BOARD ASSEMBLY 124-000326
PEDAL TONE BARS
8'
16'
390
330
220
180
100
68
39
47
820
820

CIRCUITRY

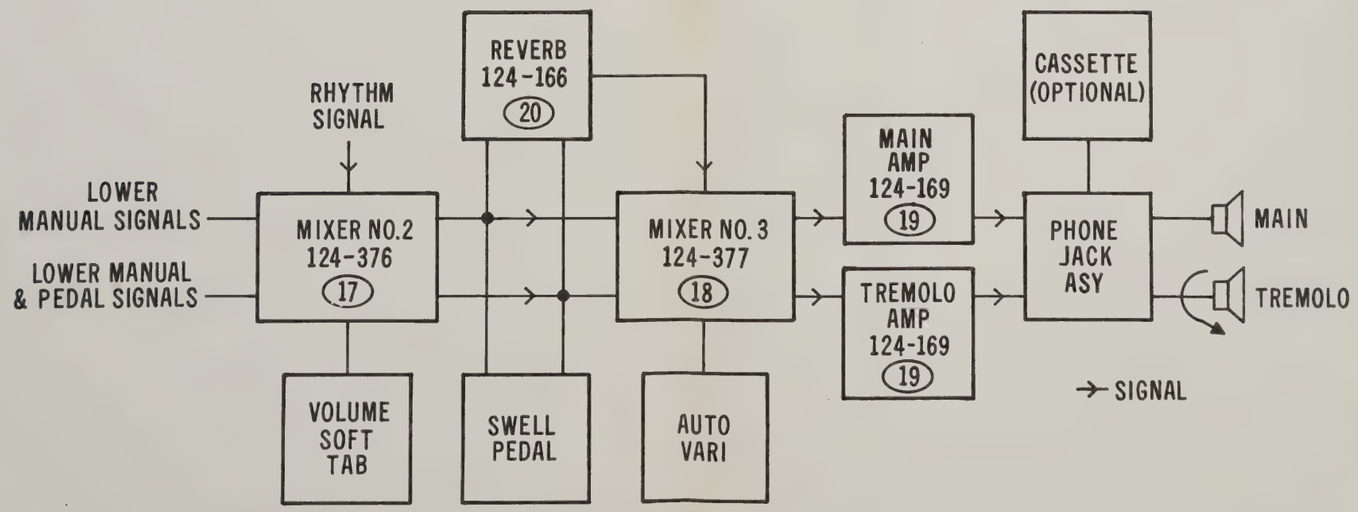

PHONE
JACK
12 INCH
SPEAKER
10 MF
6 INCH
SPEAKER
L/M&
PEDAL
SIGNAL
TREMOLO
SPEAKER
U/M
BRILLIANCE
TAB SWITCH



RHYTHM AND ASSOCIATED CIRCUITRY



SYSTEM MIXER AND AMPLIFIER



SYSTEM MIXER & AMPLIFIER

III
D TEXT

and text to illustrate and provide information

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SECTION III
DIAGRAMS AND TEXT

3-1. GENERAL.– This section contains schematic diagrams and text to illustrate and provide information necessary to proper organ servicing.

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124-000208 - BRIGHT PERCUSSION FILTER BOARD (15)

and are summed with repeated bright percussion and Piano Solo at output amplifier, Q12.

Gain controls are provided for these signals at R69 (Solo), R44 (Synthesis), and R17 (Bright). The required +21V comes from the Piano Filter Board (124-000425) which has a decoupling filter for the supply.

124-000265, 266, & 318 M.D.D. GENERATOR BD. (1)

Drawing 094-047241 is the schematic diagram for assembly 124-000265 (MDD with vibratoable LC oscillator) and for assembly 124-000266 (MDD with crystal oscillator). As indicated on the drawing, there are two (2) "boxed-in" areas; one to be used for 124-000265 and the other for 124-000266; parts not in the boxed areas are common to both assemblies. In addition, a third assembly 124-000318, is shown.

LC OSCILLATOR WITH VIBRATO

Assembly 124-000265 includes a vibrato oscillator, delayed vibrato circuitry, portamento capability (Auto-Glide), and a high frequency LC oscillator used to drive the MDD generator.

The vibrato oscillator is a phase shift type, comprised of C3, C4, C5, R9, R10, R11, R12, R13, R14, Q3 and Q4. Pot R10 is used to adjust the oscillator's frequency (6.8 HZ. nominal for fast vibrato); and R8 is externally connected to -28 volts for fast vibrato (disconnected for slow vibrato). The vibrato signal is coupled through C6, R15, and C7 to the base of transistor Q5, where it is amplified (its width being controlled by R20).

Vibrato may be turned off by connecting J146-2 to -28 volts, and may be reduced for "Vibrato Small" by connecting R16 through Pin J146-4 to -28 volts. To achieve a better sine wave the vibrato signal is filtered by C8 and is then coupled to the LC oscillator circuitry by C9 and R42. Delayed vibrato is accomplished by transistors Q1 and Q2. A -28 volt DC signal is applied to C1, which turns on Q1 for about 20 milli-seconds; this charges C2 through D1 to a ground potential, turning on Q2 for approximately one second (until C2 discharges) When Q2 is turned on, the collector "shorts" the vibrato signal to -28 volts, thus the delayed vibrato time is approximately one second. Adjustment of R6 decreases or increases the time of the delayed vibrato. If the delayed vibrato signal is applied to C1 while J146-1 is connected to -28 volts, the vibrato delay time is decreased by 90 percent.

The LC oscillator is comprised of L1, D3, C10, C11, C12, R27, R28, R29, and Q6, and is a Hartley type. D3, a varicap diode, is used to vary the oscillator's frequency for vibrato and portamento effects; as the voltage at the junction of R24, C10 and D3 becomes more negative, the capacitance of the varicap diode increases, and the oscillator frequency decreases. Since the cathode of the varicap is normally (with no vibrato) at ground potential and the anode is held at -16 volts by D5 and R32, the capacitance of the varicap remains constant (about 57 picofarads), and stability of the oscillator is maintained.

LC OSCILLATOR WITH VIBRATO(CONTINUED) (1)

Capacitor C10 is not part of the tank capacitance, but is used to isolate the DC bias on the varicap from the tank circuit. L1, in parallel with C11 and the varicap diode oscillate at 3.99872 M HZ. R28 and R29 are connected to -11 volts (generated by voltage divider R25 and R26) to supply an oscillator output swing of three volts.

A 6 percent decrease in the oscillator frequency (Portamento, or "Auto-Glide") is caused by applying -8 volts to R21 at J146-6.

The oscillator signal is coupled through C13 to buffer amplifier Q7 which drives IC1.

A variation of the vibratoable MDD generator is assembly 124-000318. On this assembly the delayed vibrato circuitry (Q1, Q2, R1, R2, R3, R4, R5, R6, R7, D1, C1, and C2) and the Portamento resistor (R21) are removed. This assembly is used on organs not requiring delayed vibrato or Portamento capabilities.

The 124-000318 MDD assembly is completely interchangeable with the 124-000265 MDD assembly.

MDD GENERATOR

Components not "boxed-in" by dotted lines are common to both the assemblies. IC1 is a signal divider; it is used to insure a square input signal with a 50 percent duty cycle to drive the MDD IC packages. This divider (IC1) may be driven by either the crystal oscillator or the vibratoable oscillator. The -5 volts for this IC is generated by D6 and R36 and bypassed by C15.

IC 2 and IC3 are the two MDD frequency generators; IC2 generates frequencies F92 through F97 and F85. IC3 generates frequencies F86 through F91. IC1 drives buffer Q9, supplying an 11 volt 1.99936 M HZ. clock signal for the MDD packages. Diodes D10 and D11 supply protection for the clock input gates on the MDD packages.

Three power supplies, -11 volts, -16 volts and -28 volts, are required for the operation of the two MDD packages. The -28 volts is supplied from the organ power supply. The -16 volts supply is generated by two diode drops (D8,9) from -14 volts through R37 to -28 volts. R40 and R41 form a voltage divider between ground and -14 volts to generate the -11 volt supply. (The -11 volt current, and the -16 volt supply may draw 24 to 70 MA.) Each of the three supplies is protected from static discharge by a capacitor (C21,22,23). The -16 volt supply is filtered by C20.

All ouptuts of the MDD generator IC packages are protected by a diode connected to -16 volts (diodes D12 to D24).

(9)

124-000310, (124-000202, 124-000204,) SINE WAVE FILTER BDS.

These printed wiring boards work together as a unit. There are fourteen (14) filter groups in each set to match the fourteen (14) signal output terminals of a typical 380 assembly. Each group passes one 12 interval octave plus one note, with the exception of group #1, which is for frequency #1 thru #12 only. Pass bands of the filter groups overlap by necessity due to the combination of pitches on the 380 outputs. A total range of 8 octaves is available. (frequency #1 thru

124-000310 (124-000202, 12 000326 PEDAL BOARD (CONTINUED)
BOARDS (CONTINUED)

Pedal Gate Signal Amp. and Divide
#97). On the first five Pedal Voicing Filters.
used at the input to dev
rent from the 380 keyers Pedal Touch and sustain control functions are
80 mv peak to peak for o rmed by transistor Q14 and Q15. Transistor Q14
On all remaining groups s "on" whenever any pedal is depressed and "off"
a bus amplifier input of released. The output of Q14 is applied to the
The output current at th trigger input of the rhythm unit (for Touch
the same amplitude as is and Follow the Player functions) through P836-
resistors on the first f he input of Q15 which turns "on" whenever a
to prevent IM distortion is depressed (to discharge all sustain capa-
IC keyers. It is not ne s on the 124-000361 PWB), and to the pedal
groups because the IM di in envelope generator through Diode D15.
sub-audible. Most of th
pole, active band-pass f Pedal Sustain Envelope Generator outputs con-
pronounced peak near the the pedal percussion gates and generator sync.
second stage starts the ol circuits. When pedal sustain is "off",
of the pass band, a comb- 13 is grounded, providing a low impedance dis-
ably flat pass-band with e path for capacitor C13. With sustain "on",
Input and output couplin ust discharge through R59 and R60. Transistor
keying thumps by providi s used to provide a low impedance output for
Filter group #1 has one ustain waveform. The output of Q16 (P836-14)
wave purity requirements ed to control the sync. circuits because the
quencies. Filter group circuitry cannot be turned on until the
harmonics are at the upp in waveform has decayed.
nals from the 124-000310
124-000202 board where Q utput of the Pedal Sustain Envelope Generator
outputs of groups one th nnected to the Pedal Percussion Gates and snub-
amplifiers. The remaini ontrol circuits. Transistor Q17 is used to
from the phase inverter h the two (2) pedal snubbers (Q9 and Q10 "off"
the 124-000202 board. M a pedal is depressed and "on" after the pedal
of each filter group are in waveform has decayed to 0 volts. The
sary tapering. (Higher snubbers are needed to silence the pedal gates
the Auto-Accompaniment Bass Percussion Waveform
TVI suppression capacit ator is activated by the rhythm unit, but NO
resistors are used to pr is depressed. The Pedal Sustain Envelope
amp of the phase inverte orm is applied to the two percussion gates thru
D10 and D11. With the rhythm unit in the
124-000321 - 380 GENERAT Accompaniment mode, a ground is applied to P836-
ich will turn sustain "off" through Diode D16
This "380" generator boa round (through D17) the Pedal Percussion Gate
380 IC's, 44 Upper Manua signal.
board also provides resi
tecting the IC's. uto-Accomp. Bass Percussion Waveform Generator
des the negative percussion signals for the two
The twelve (12) IC's are percussion gates. The rhythm High-Bass output
(12) frequencies generat plied to P836-10 and the Low-Bass output is
directly to P7. ed to P836-4. These negative going rhythm sig-
are buffered by Q6 and Q11 respectively. If
Each IC generates all fr Accompaniment is "off", Diodes D5 and D6 ground
bars for each octave-rel hythm signals. With Auto-Accompaniment "on"
all frequencies by the 4 discharged very rapidly through Q7 and D7
through #8 provide four ng a negative going percussion signal to be
quency, and IC's #9 thro ed through D9, R22 and R23 to the base of Q8,
The sync and clear lines ' audio gate. The 8' stairstepped waveform at
5th dividers with the pr mittter of Q8 appears as a percussion signal at
ollector of Q8 because the gain of Q8 varies
Upper Manual key #8 is c ding to the percussive base current signal. The
key is depressed, -27V i t of "tail" on the percussion signal depends on
D25 and R18. When the S tting of R26 which sets the bias voltage on
grounded through P7-1 an ase of Q8 and Q13. The 16' percussion gate
SUSTAIN tab is "on", R16 tes in the same manner as the 8' percussion gate.
R293. The -27V input sig
sistor R18. Capacitor C tairstepped pedal signal passed by one of the
constant. If SUSTAIN is gate circuits on the 124-000361 pedal gate
R18, D25, and R16 to gro ync. PWB is connected to P837-1 on the Pedal
discharges through R18, I This signal applied to Q18 and Q19, which form
C3 has discharged to -14V h input impedance amplifier. The output of
biased, and C3 then conti amplifier is connected to both 8' and 16' pedal
(keyer cut-off voltage) t ssion gates and to differential amplifier Q20,

THEORY OF OPERATION OF P.W. BOARDS

124-000166 REVERBERATION BOARD (20)

Signal is fed through R1, R2, or R3 and coupled through C2 to the base of Q1. Bias for Q1 is supplied through R5. From the collector of Q1, the signal is coupled directly to the base of emitter follower Q2. Bias for Q2 is provided through R7. The signal from the emitter of Q2 is developed across R8 and coupled by C3 and R9 to the base of Q3. Bias for Q3 is supplied through R11. From Q3 collector the signal is coupled in half-wave position to the push-pull amplifier comprised of Q4 and Q5. The negative portion of the signal is coupled directly to the base of Q4, a PNP.

Forward bias on D1 and D2 prevents the negative portion of the signal from reaching Q5. The positive portion of the signal is of sufficient amplitude to reverse bias D1 and D2, and this portion of the signal is then passed to the base of Q5 an NPN. The outputs of the two transistors are combined at the junction of R17 and R18, and coupled through C6 and J2-1, to drive the reverberation unit whose input is connected to this point. Negative degenerative feedback is taken from R16, and connected through R15 to the emitter of Q1.

REVERBERATION RECOVERY

Through a reverberation unit there is considerable loss of signal strength. Therefore, the output of the unit must be amplified to restore the signal to sufficient amplitude to drive a power amplifier.

The signal from the reverberation unit at J2-5 is coupled through R19, R20, and C9 to the base of Q7. Bias and feedback for Q7 are supplied through R21. The output at Q7 collector is coupled directly to the base of Q8. The signal of the Reverberation recovery at the emitter of Q8 is coupled to J1-1 through C11 and R26. Resistor R26 is part of a Reverb. Volume control.

124-000169 - 35 WATT POWER AMP MODULE (19)

A differential amplifier used for the input circuit keeps the output at D.C. ground by compensating the bias of the output transistors. This circuit makes quasi-complementary output practical by eliminating the bias problems. Transistors Q1 and Q2 are biased equally to ground with R3 and R5. Since the load is connected to the base of Q2 through R5, ground potential is achieved at the load.

The D.C. feedback path from the load to the base of Q2 also presents a convenient way to apply A.C. feedback. The amount of feedback is controlled by R8 and R5 and their ratio determines the overal gain of the amplifier. The high open loop gain, which permits the large negative feedback, is due to transistor Q3 which operates class A with its emitter at A.C. ground. This means that Q3 must withstand the total voltage across the amplifier.

Three diodes, D1, D2, and D3, represent part of the load seen by Q3 and perform the important function of biasing the output transistors. In order for Q6 and Q7 to be biased on, the voltage drops across D1, D2, and D3 must equal the voltage drops across the emitters Q4, Q5 and Q7 plus the drops across D8, R16, and R17. The current through the three series diodes is determined by R9, and R10, and this current, in turn, determines the voltage drop across the diodes. A Q6, Q7 quiescent current of approximately 40 MA is necessary to prevent crossover distortion.

124-000169 - 35 WATT POWER AMP MODULE(CONTINUED) (19)

Transistors Q5 and Q7 are NPN Darlington connected, while Q4 and Q6 act like a PNP Darlington connection. Resistor R15 and D8 causes the overall transconductance of Q4 and Q6 to be nearly the same as that of Q5 and Q7 thereby improving the linearity of the output stage. A bootstrap capacitor C7 is connected between R9 and R10 enabling Q6 to be driven into saturation. Without the positive feedback path through C7, there is insufficient drive to Q6 for symmetrical output.

RC pad R18, and C10 across the load provides high frequency stabilization. Short-circuit protection is accomplished during the positive cycle by series-connected diodes D1 to D6, in parallel with Q4 and Q5 emitters and R17. The diodes shunt the drive to Q7 and clamp its collector current at a level just above the normal peak load current. The collector current of Q6 is clamped during the negative cycle in the same manner as that of Q7 with diodes D5 and D3.

124-000202 - SINE WAVE FILTER BOARD #2 (7)

The Sine Wave is used to produce sine wave tone from a square wave input such as that provided by the 380 I.C. package. A complete set of filters consists of PWB Assemblies 124-000310, 202 and 204.

The Sine Wave Filter consists of four (4) sections; each section will pass a band of thirteen (13) notes. The outputs are collected at pin number eleven (11). There is one Phase Invertor, one Sine Filter Output Amplifier, and four (4) Bus Preamplifiers.

124-000204 - SINE WAVE FILTER BOARD #3 (8)

The Sine Wave Filter is used to produce sine wave tones from a square wave input such as that provided by the 380 I.C. package. A complete set of filters consists of PWB Assemblies 124-000310, 202 and 204.

The Sine Wave Filter consists of five (5) sections; each section will pass a band of thirteen (13) notes. All outputs are collected at pin number eleven (11). There are also five (5) Filter Bus Preamps on this PWB.

124-000208 - BRIGHT PERCUSSION FILTER BOARD (15)

Signals enter the board at J106 and pass thru three (3) active filters; Pizzicato 1, 2 and Banjo, a passive filter is used for Harpsichord. The filter outputs are mixed with a Piano voice input from the 124-000425 board into the repeat gate composed of Q7, Q8, Q9 and Q10, a two stage differential amplifier that has the emitter current of its first stage (Q7-Q8) supplied by a sawtooth repeat signal from J147 on the Repeat Oscillator and Detector board (124-000409) when repeat is on, or a D.C. level when repeat is off. There is a null adjustment (R28) to minimize repeat thump, requiring a matched pair of transistors (001-021260-001) in the first stage to achieve the best null. Tab action changes the level of D.C. or sawtooth signal to the repeat gate, providing Fortissimo as desired. When Piano Solo is used, repeat signal and control voltage are removed, turning off Bright Percussion. On/Off gating at Q2 amplification at Q3 are provided for Piano Solo whose input at pin 2 bypasses the repeat gate. Synthesis percussion signals enter this board at pin 19

124-000208 - BRIGHT PERCUSSION FILTER BOARD (15)

and are summed with repeated bright percussion and Piano Solo at output amplifier, Q12.

Gain controls are provided for these signals at R69 (Solo), R44 (Synthesis), and R17 (Bright). The required +21V comes from the Piano Filter Board (124-000425) which has a decoupling filter for the supply.

124-000265, 266, & 318 M.D.D. GENERATOR BD. (1)

Drawing 094-047241 is the schematic diagram for assembly 124-000265 (MDD with vibratoable LC oscillator) and for assembly 124-000266 (MDD with crystal oscillator). As indicated on the drawing, there are two (2) "boxed-in" areas; one to be used for 124-000265 and the other for 124-000266; parts not in the boxed areas are common to both assemblies. In addition, a third assembly 124-000318, is shown.

LC OSCILLATOR WITH VIBRATO

Assembly 124-000265 includes a vibrato oscillator, delayed vibrato circuitry, portamento capability (Auto-Glide), and a high frequency LC oscillator used to drive the MDD generator.

The vibrato oscillator is a phase shift type, comprised of C3, C4, C5, R9, R10, R11, R12, R13, R14, Q3 and Q4. Pot R10 is used to adjust the oscillator's frequency (6.8 HZ. nominal for fast vibrato); and R8 is externally connected to -28 volts for fast vibrato (disconnected for slow vibrato). The vibrato signal is coupled through C6, R15, and C7 to the base of transistor Q5, where it is amplified (its width being controlled by R20).

Vibrato may be turned off by connecting J146-2 to -28 volts, and may be reduced for "Vibrato Small" by connecting R16 through Pin J146-4 tc -28 volts. To achieve a better sine wave the vibrato signal is filtered by C8 and is then coupled to the LC oscillator circuitry by C9 and R42. Delayed vibrato is accomplished by transistors Q1 and Q2. A -28 volt DC signal is applied to C1, which turns on Q1 for about 20 milli-seconds; this charges C2 through D1 to a ground potential, turning on Q2 for approximately one second (until C2 discharges) When Q2 is turned on, the collector "shorts" the vibrato signal to -28 volts, thus the delayed vibrato time is approximately one second. Adjustment of R6 decreases or increases the time of the delayed vibrato. If the delayed vibrato signal is applied to C1 while J146-1 is connected to -28 volts, the vibrato delay time is decreased by 90 percent.

The LC oscillator is comprised of L1, D3, C10, C11, C12, R27, R28, R29, and Q6, and is a Hartley type. D3, a varicap diode, is used to vary the oscillator's frequency for vibrato and portamento effects; as the voltage at the junction of R24, C10 and D3 becomes more negative, the capacitance of the varicap diode increases, and the oscillator frequency decreases. Since the cathode of the varicap is normally (with no vibrato) at ground potential and the anode is held at -16 volts by D5 and R32, the capacitance of the varicap remains constant (about 57 picofarads), and stability of the oscillator is maintained.

LC OSCILLATOR WITH VIBRATO(CONTINUED) (1)

Capacitor C10 is not part of the tank capacitance, but is used to isolate the DC bias on the varicap from the tank circuit. L1, in parallel with C11 and the varicap diode oscillate at 3.99872 M HZ. R28 and R29 are connected to -11 volts (generated by voltage divider R25 and R26) to supply an oscillator output swing of three volts.

A 6 percent decrease in the oscillator frequency (Portamento, or "Auto-Glide") is caused by applying -8 volts to R21 at J146-6.

The oscillator signal is coupled through C13 to buffer amplifier Q7 which drives IC1.

A variation of the vibratoable MDD generator is assembly 124-000318. On this assembly the delayed vibrato circuitry (Q1, Q2, R1, R2, R3, R4, R5, R6, R7, D1, C1, and C2) and the Portamento resistor (R21) are removed. This assembly is used on organs not requiring delayed vibrato or Portamento capabilities.

The 124-000318 MDD assembly is completely interchangeable with the 124-000265 MDD assembly.

MDD GENERATOR

Components not "boxed-in" by dotted lines are common to both the assemblies. IC1 is a signal divider; it is used to insure a square input signal with a 50 percent duty cycle to drive the MDD IC packages. This divider (IC1) may be driven by either the crystal oscillator or the vibratoable oscillator. The -5 volts for this IC is generated by D6 and R36 and bypassed by C15.

IC 2 and IC3 are the two MDD frequency generators; IC2 generates frequencies F92 through F97 and F85. IC3 generates frequencies F86 through F91. IC1 drives buffer Q9, supplying an 11 volt 1.99936 M HZ. clock signal for the MDD packages. Diodes D10 and D11 supply protection for the clock input gates on the MDD packages.

Three power supplies, -11 volts, -16 volts and -28 volts, are required for the operation of the two MDD packages. The -28 volts is supplied from the organ power supply. The -16 volts supply is generated by two diode drops (D8,9) from -14 volts through R37 to -28 volts. R40 and R41 form a voltage divider between ground and -14 volts to generate the -11 volt supply. (The -11 volt current, and the -16 volt supply may draw 24 to 70 MA.) Each of the three supplies is protected from static discharge by a capacitor (C21,22,23). The -16 volt supply is filtered by C20.

All ouptuts of the MDD generator IC packages are protected by a diode connected to -16 volts (diodes D12 to D24).

124-000310, (124-000202, 124-000204,) SINE WAVE FILTER BDS. (9)

These printed wiring boards work together as a unit. There are fourteen (14) filter groups in each set to match the fourteen (14) signal output terminals of a typical 380 assembly. Each group passes one 12 interval octave plus one note, with the exception of group #1, which is for frequency #1 thru #12 only. Pass bands of the filter groups overlap by necessity due to the combination of pitches on the 380 outputs. A total range of 8 octaves is available. (frequency #1 thru

124-000310(124-000202,124-000204,) SINE WAVE FILTER BOARDS (CONTINUED) (9)

#97). On the first five groups, a 150 ohm resistor is used at the input to develop the square wave output current from the 380 keyers into a signal of approximately 80 mv peak to peak for one note at tonebar position 8. On all remaining groups the keyer current is summed in a bus amplifier input of very low impedance (10 ohms). The output current at the collector of this stage is the same amplitude as is developed across the 150 ohm resistors on the first five groups. The bus amp is used to prevent IM distortion from inter-action between the IC keyers. It is not needed on the lower frequency groups because the IM difference frequencies are most sub-audible. Most of the filter groups are two stage, 8 pole, active band-pass filters. The first stage has a pronounced peak near the top of the pass band. The second stage starts the roll-off just above the low end of the pass band, a combination which provides a reasonably flat pass-band with a sharp attenuation curve. Input and output coupling capacitors are used to reduce keying thumps by providing low frequency roll-off. Filter group #1 has one RC section deleted as the sine wave purity requirements are not as severe at low frequencies. Filter group #14 has only one stage since the harmonics are at the upper limit of hearing. All signals from the 124-000310 and 124-000204 boards go to the 124-000202 board where Q13, a phase diverter, sums the outputs of groups one thru five which do not have bus amplifiers. The remaining signals along with those from the phase inverter feed into Q14, an output amp on the 124-000202 board. Mixing resistors in the output of each filter group are selected to provide the necessary tapering. (Higher output at lower frequencies).

TVI suppression capacitors are provided and isolating resistors are used to prevent failure of the output amp of the phase inverter.

124-000321 - 380 GENERATOR BOARD- 8200 SERIES (2)

This "380" generator board is comprised of twelve (12) 380 IC's, 44 Upper Manual sustain time constants. This board also provides resistors, and capacitors for protecting the IC's.

The twelve (12) IC's are connected to the highest twelve (12) frequencies generated by the MDD board and connected directly to P7.

Each IC generates all frequencies required by the 9 tonebars for each octave-related key; e.g., IC #1 provides all frequencies by the 4 Upper Manual "C" keys. IC's #1 through #8 provide four octaves of their designated frequency, and IC's #9 through #12 provide three octaves. The sync and clear lines are synchronizing the 3rd and 5th dividers with the proper fundamental frequency.

Upper Manual key #8 is connected to P1-1. When this key is depressed, -27V is connected to the junction of D25 and R18. When the SUSTAIN tab is "off", R16 is grounded through P7-1 and the SUSTAIN switch. If the SUSTAIN tab is "on", R16 is connected to -14 V through R293. The -27V input signal charges C3 through resistor R18. Capacitor C3 is part of the sustain time constant. If SUSTAIN is "off", C3 discharges through R18, D25, and R16 to ground. With SUSTAIN "on", C3 discharges through R18, D25, R16, and R293 to -14V. When C3 has discharged to -14V, diode D25 becomes reversed biased, and C3 then continues discharging to -2.5V (keyer cut-off voltage) through R19. This RC combination

124-000321 - 380 GENERATOR BOARD 8200 SERIES (CONTINUED)

provides a medium sustain time constant. Resistor R20 connects the signal from Upper Manual key #8 to IC-1, Pin 4.

The outputs of the tonebar buffer circuits are connected to P6, which supplies the DC tonebar output voltage to each IC.

The Upper Manual outputs from the twelve (12) "380" IC's are connected to the appropriate filter input line, which is then connected through J5 to a sine filter board. The resistive terminations on the filter output lines are for IC protection when the filters are not connected.

124-000323 - KEYER-DIVIDER BOARD (3)

This printed wiring board assembly contains four (4) IC packages. These packages contain all circuitry associated with dividing the top octave frequencies down to the frequencies actually used in the organ. It also contains the keying inputs for the Upper Manual Bright Percussion and the keying time constants for each key of the Lower Manual.

When a Lower Manual low "C" key is depressed -28V DC is connected thru the manual to J907-Pin 16 to the keying network consisting of R1, R2, and C1. This network is used to prevent key turn "on" and turn "off" thumps.

The keying signal from R2 is connected to Pin 14 of IC 1. This turns on four (4) keyers which provide four (4) different pitches of outputs for that "C" note. The 16' output appears at IC 1-Pin 22, the 8' output at Pin 4 of IC 1, the 4' output at Pin 21-IC 1 and the 2' output at IC 1-Pin 20. All of the 16; IC outputs (8' L.M.) are connected together and fed to J904-Pin 8. All 4' outputs (2' L.M.) are connected together and fed to J904-Pin 11. The 2' outputs (1' L.M.) are connected together and fed to J904-Pin 12. The 8' outputs (4' L.M.) are brought out to J904-Pins 3, 4 and 5. The outputs above are fed through the appropriate pin of J904 and connected to the buss amplifier assembly 124-000320.

When the upper manual low "C" key is depressed, a -27V percussive signal (applied thru percussion keyer board, 124-000364) is applied to J902-16 thru protection resistor R94 to Pin 9 of IC 1. The output signal, a three (3) component staircase waveform, appears at J904-Pin 7. This percussion signal (16' Upper Manual) is then coupled thru Lower Manual Bus Amp. PWB 124-000362 to J126-Pin 10 (Percussion Bus Amp. Input) on the Upper Manual Synthesis Percussion PWB 124-000425.

The pedal outputs also come out of the IC packages. Low "C" pedal output appears at J906-Pin 2. These pedal signals are always "on" and are coupled to pedal gates on the pedal gate and sync. PWB Assembly 124-000361.

124-000326 - PEDAL BOARD (16)

The pedal board for the 8000 Series organs contains various circuits for controlling Upper Manual, Lower Manual and pedal functions. The operation

124-000326 PEDAL BOARD (CONTINUED) (16)

of these various functions is as described below.

UPPER MANUAL - There are two (2) circuits which affect Upper Manual operation; they are: the Percussion Bias circuit and the Upper Manual Tonebar Supply Circuit.

The percussion bias adjustment is just a potentiometer (R13) with a series resistor (R12) to limit the negative voltage applied to the pot to approximately -4.5V. The potentiometer is used to adjust the bias voltage applied to the Bright Percussion Keyer (Pizzicato thru Piano Solo) for a long, smooth sustain "tail".

The Upper Manual Tonebar supply circuit (Q5, R14-R16) is needed to supply a constant -8 volts to the tonebar resistor couplate. This supply determines the maximum voltage which can be applied to the "380" IC tonebar control inputs.

LOWER MANUAL - There are three (3) basic circuit functions for Lower Manual operation: 1. Auto-Accomp. Lower Manual Percussion/Control Circuit, 2. Lower Manual Auto-Accompaniment Percussion Gate and 3. Lower Manual and Pedal Preamplifier.

The Auto-Accompaniment Percussion/control circuit operates in two (2) basic modes; Auto-Accomp. or Organ mode. In the "Organ" mode, a ground is applied to P836-9 which turns "on" Q4, applying a small DC current thru resistors R8 and R100 to turn "on" the Lower Manual percussion gate (Q29 and Q30). With P836-9 grounded, rhythm pulses are shunted to ground through diodes D4, D5 and D6. Transistor Q3 is a Lower Manual Key-down Detector which is needed to keep rhythm pulses from keying the percussion gate when Lower Manual keys are not depressed and Auto-Accompaniment is "on". In the Auto-Accompaniment mode, negative pulses from the rhythm unit are buffered by emitter follower Q1 and turn "on" transistor Q2 momentarily discharging C1 to ground. The negative going percussion signal appearing at the junction of C1, D2 and R6 is applied to the Lower Manual percussion gate through resistors R6 and R100.

The Lower Manual Auto-Accompaniment Percussion gate is comprised of transistors Q29, Q30 (a matched differential pair), Q27 and Q28 (an unmatched differential pair). Lower manual signals (from tonebar output) are coupled to Q29 through R107 and C32. In the Auto-Accompaniment mode, a percussive signal current is applied to the emitter of Q29 and Q30, causing the AC gain of this stage to vary directly with the current. Transistors Q27 and Q28 amplify the AC signal appearing at their bases and reject the DC signal component. Potentiometer R101 is used to balance the outputs of Q29 and Q30 to minimize percussion "thump".

The output of the percussion gate is connected through P836-3 to P837-9, the input of the Lower Manual and Pedal Preamplifier. All input signals are amplified by Q25 and buffered by Q26. When Brilliance is "off" a ground is connected through P837-12 to C27, thereby shunting some high frequencies to ground. With Brilliance "on", P837-12 is opened, effectively removing C27 from the circuit.

PEDAL CIRCUITS - There are six (6) pedal circuit functions performed on this PWB assembly.
1. Pedal Touch and Sustain Control.
2. Pedal Sustain Envelope Generator
3. Pedal Percussion Gates and Snubber Control.
4. Auto-Accompaniment Bass Percussion Waveform Generator.

124-000326 PEDAL BOARD (CONTINUED) (16)

5. Pedal Gate Signal Amp. and Divider
6. Pedal Voicing Filters.

The Pedal Touch and sustain control functions are performed by transistor Q14 and Q15. Transistor Q14 turns "on" whenever any pedal is depressed and "off" when released. The output of Q14 is applied to the pedal trigger input of the rhythm unit (for Touch Start and Follow the Player functions) through P836-16, the input of Q15 which turns "on" whenever a pedal is depressed (to discharge all sustain capacitors on the 124-000361 PWB), and to the pedal sustain envelope generator through Diode D15.

The Pedal Sustain Envelope Generator outputs control the pedal percussion gates and generator sync. control circuits. When pedal sustain is "off", P836-13 is grounded, providing a low impedance discharge path for capacitor C13. With sustain "on", C13 must discharge through R59 and R60. Transistor Q16 is used to provide a low impedance output for the sustain waveform. The output of Q16 (P836-14) is used to control the sync. circuits because the sync. circuitry cannot be turned on until the sustain waveform has decayed.

The output of the Pedal Sustain Envelope Generator is connected to the Pedal Percussion Gates and snubber control circuits. Transistor Q17 is used to switch the two (2) pedal snubbers (Q9 and Q10 "off" when a pedal is depressed and "on" after the pedal sustain waveform has decayed to 0 volts. The pedal snubbers are needed to silence the pedal gates when the Auto-Accompaniment Bass Percussion Waveform Generator is activated by the rhythm unit, but NO pedal is depressed. The Pedal Sustain Envelope Waveform is applied to the two percussion gates thru R63, D10 and D11. With the rhythm unit in the Auto-Accompaniment mode, a ground is applied to P836-12 which will turn sustain "off" through Diode D16 and ground (through D17) the Pedal Percussion Gate input signal.

The Auto-Accomp. Bass Percussion Waveform Generator provides the negative percussion signals for the two pedal percussion gates. The rhythm High-Bass output is applied to P836-10 and the Low-Bass output is applied to P836-4. These negative going rhythm signals are buffered by Q6 and Q11 respectively. If Auto-Accompaniment is "off", Diodes D5 and D6 ground the rhythm signals. With Auto-Accompaniment "on" C3 is discharged very rapidly through Q7 and D7 causing a negative going percussion signal to be coupled through D9, R22 and R23 to the base of Q8, the 8' audio gate. The 8' stairstepped waveform at the emittter of Q8 appears as a percussion signal at the collector of Q8 because the gain of Q8 varies according to the percussive base current signal. The amount of "tail" on the percussion signal depends on the setting of R26 which sets the bias voltage on the base of Q8 and Q13. The 16' percussion gate operates in the same manner as the 8' percussion gate.

The stairstepped pedal signal passed by one of the pedal gate circuits on the 124-000361 pedal gate and sync. PWB is connected to P837-1 on the Pedal PWB. This signal applied to Q18 and Q19, which form a high input impedance amplifier. The output of this amplifier is connected to both 8' and 16' pedal percussion gates and to differential amplifier Q20,

124-000361 – PEDAL SYNC (CONTINUED) (11)

synchronize the twelve (12) "380" IC's (upper manual synthesis generator) to the four (4) "429" IC's. The pedal output frequencies from the "429" generator are switched to the IC operating mode when pedals are not depressed. This waveform is coupled through R114 and differentiated by capacitor C25. Whenever the input waveforms make a positive going transistion, a short positive pulse is applied to the base of Q25, thus turning Q25 "off", generating a -14V, 15 micro second pulse at J807, Pin 2. If a pedal were being depressed, there would be a negative voltage at J809, Pin 7, causing Q26 to saturate and clamp the output of Q25 approximately 0.8V through diode D25. All twelve (12) sync. circuits are identical to that described above.

124-000362 LOWER MANUAL BUS AMP BOARD (6)

This PWB Assembly is comprised of the following circuits: Four (4) L/M Bus Amplifiers, seven (7) L/M Voicing Filters and a Sync. Control signal inverter.

Transistor Q1 is a grounded base amplifier which is used to provide a low impedance for the 1' signal currents generated by the 124-000323 Generator PWB. This signal is coupled through C1 to the emitter of Q1. The output of Q1 appears at the collector as a staircase signal approximately 2.5V P-P. The output of Q1 is coupled through C2 to the 1' mellow Filter Network. The output is also coupled through R9 to provide a 1' component to the 2' bright filter and through R18 to provide a 1' component to the 4' bright filter.

Transistor Q2 is the 2' bus amplifier and its operation is identical to that of transistor Q1. This stage provides a 2' square wave through resistor R10 of transistor Q1. This stage provides a 2' square wave through resistor R10 where it is combined with a 1' square wave to form a 2 element (4 step) staircase wave form. This wave form is coupled through C6 and R12, the 2' Bright Filter. The output of transistor Q2 is also coupled to the 2' mellow filter through capacitor C7 and provides a 2' component for the 4' Bright Filter, 8' Mellow and 8' Bright Filters.

Transistors Q3 and Q4 operate similar to Q1 and Q2 with Q3 providing a 4' square wave for the 4' Bright and Mellow Filter and Q4 feeding the 8' Mellow and Bright Filters.

Transistor Q5 is an inverter for the negative sync. control input signal. The output of Q5 is connected to the pedal control input of the 075-000429 IC on the 124-000323 Generator Board. This signal changes the pedal output frequency from 8' to 16'. When this output signal is -28V (no pedal depressed), the pedals are at 16' and provide sync signals (sync circuits located on the 124-000361 PWB) to the 075-000380 IC's on the 124-000321 Generator Board.

Whenever a pedal is depressed, the output of Q5 becomes grounded and the 075-000429 pedal output frequencies return to the 8' frequency.

124-000364 & 124-000365 PERCUSSION KEYER #1 & PERCUSSION KEYER #2 (4) (5)

These two (2) board assemblies provide forty-four (44) convertible percussion time constant circuits for the Upper Manual Bright Percussion Voices and also provide isolation Diodes for the Upper Manual sustainable time constant circuits.

124-000364 & 375 PERCUSSION KEYERS (CONTINUED) (4) (5)

Diode D1 is the isolation Diode used to isolate the sustain time constant for key #1 on the 124-000321 Generator PWB.

The percussion time constants can operate in percussion or non-percussion modes, depending on convert bus. In the percussion mode the convert bus (J814, J815, Pin 2) is grounded. When an Upper Manual key is depressed, -28V is applied to the junction of RL-C1. Capacitor passes the initial spike as the key closes. As the key remains closed, resistors R2 to R4 drain off the charge on the keyer side of C1 toward the cut-off bias voltage. (Bias adjustment is located on the 124-000326 PWB and is connected to the sustain 4 bus). If the key is released immediately after it is played, capacitor C10 will discharge through these same resitors to give a short key-up tail to the note. Diode D4 prevents discharging through the input circuit. Resistor R5 is used in conjunction with capacitor C2 to slightly slow down the attack time to prevent "key click". When "Sustain 1" and sustain 3" bus levers are returned to the cut-off bias voltage, the short "Pizzicato" time constant is in use. When "sustain 1" bus is returned to -14V a "Medium" time constant is in effect for Banjo percussion. When "sustain 3" line is opened also, a long time constant is in effect for Piano and Harpsichord. When "Sustain 1" is returned to -14V, a short pulse is produced at the beginning of the percussion envelope which simulates a "strike" tone and allows fast repeats, even with long sustain effects such as Piano.

When the "convert Bus" is opened, the percussion keyer performs a straight-through keying function. Resistor R1 and Diode D3 provide for fast discharging of C1 for "straight" keying. Diode D2 provides isolation between keyers in this mode.

All keyes on these two boards are identical in operation. The only difference between keyer is the length of the time constant, which is varied by changes in values of C1 and C2.

124-000376 - MIXER #2 BOARD (17)

Mixer PWB #2 (124-000376) is used to provide swell pedal contouring for Main and Tremolo channels, mixing of upper and lower manuals into Tremolo, and mixing of Percussion and Rhythm channels into the Main channel. Volume soft for the Main and Tremolo channels and Brilliance for the upper manual circuits are also located on this board.

MAIN CHANNEL - The upper manual signal is received at J143-5 and Q13, an emitter follower stage which provides for Brilliance control at J143-4. The signal exits at J143-1 and is passed either to J143-9 or J143-12 through the "Tremolo on Upper" tab in the organ. J143-9 and J143-10 receive upper and/or lower manual signals respectively from the organ Tremolo tabs and apply them to CE Amplfiier Q1 for "Main Channel" routing. At J144-8 signals from J143-2 are received and mixed with Rhythm signals entering at J144-9, and Percussion Filter signal entering at J144-10. C15 then couples these signals to the base of CE Amplifier Q6, through the collector to the base of Q7. The Swell Pedal photocell controls signal level from J144-7 by varying the impedance from that pin to ground. Series resistor R59 is used to dampen a tendency to oscillate due to external wire characteristics. Emitter follower Q7 then passes the signal out J144-6 and into J143-14,

124-000376 - MIXER #2 BOARD

Main Channel volume soft ci
grounded, the voltage-divid
provide frequency dependent
Soft at J143-13.

TREMOLO CHANNEL - Signal in
arrive at J143-12 and/or J1
lower Tremolo tabs respecti
Q2 (Base to Collector) and
Tremolo Volume Soft. A gro
vides a frequency dependent
Channel. The signal is the
Q3 passes through emitter f
J143-7. Swell Pedal action
described for Main Channel.

124-000377 MIXER BOARD #3

Mixer PWB #3 is used to pro
the power amplifier, phono p
filter, and swel pedal cont
noise voices.

The final mixers for both M
have a low enough output im
external lead in addition t
so that they can be used to

124-000379 - SEE AUTO VARI

124-000380 - SEE AUTO VARI

124-000409 REPEAT OSCILLATO

The Repeat Oscillator and D
upper manual keys have been
Legato and Touch circuitry
generate repeat and alterna
signals. The legato pulse
manual is also located on t

Transistor Q1 is the Upper
When no keys are played, Q1
15 is near -28V.

If any keys are played, cur
Base Emitter and R2 turns o
drops to -26.5V, firing mon
Q3 and Q4. A negative goin
lector of Q4 enters the "OR
with negative voltage from
through D2, and is applied
causing terminal 19 to go t

The monostable responds to
ures by generating a -28V p

REPEAT OSCILLATOR AND KEYER

When no keys are being play
keeping C5 discharged. Upo
biased off, and C5 starts c
the repeat rate potentiomet
until C5 charges to a speci
turns on and quickly discha
current flow through R15 pr
amplified by Q9 and used to
multivibrator Q11 and Q12.

The repeat oscillator can al
cation of -24V at Pin 21. T
and allows C5 to charge.

U.M. SYNTHESIS PERCUSSION (CONTINUED)

open on single harmonic percussions. R11
bias adjustment that gives a smooth decay
choff. The output of Q1 is a negative going
arly 14V in amplitude and is coupled to the
and Q5 through D4 and D5 if the Repeat tab
rning Repeat on grounds the junction D4 and
Q5 invert Q1's output and reference it to
e outputs are connected to the 124-000351
l preset PWB. When in the repeat mode, D8
ungrounded, allowing the phase A & B repeat
pass to the base of Q4 and Q5 and on to the
d as did the percussion.

orm a percussion enable gate, -8 volts is
om the "DB and percussion" and "percussion
on to turn Q3 off and allow percussion and
unction. Q7 is used to restore the organ to
mode for piano solo if 2nd voice is on. Q8
rato for piano solo. Q6 reduces the DC
ed to the bright percussion gate on the
board in 2nd voice mode to match the audible
rcussion and 2nd voice.

also contains a bright bus amp and piano
e stairstep wave output from the U.M. 380
eveloped across R34 and amplified by Q9.
connected to the bright percussion tab
nd R40 provides controlled "robbing" between
Q10 and Q11 form a band pass active filter
Piano solo output is taken at a higher
e that the ground for the signal circuitry
from the control circuits ground in case
sary to separate them in the organ for
e pickup.

al transistor, Q12, is used to remove sustain
rcussion when 2nd voice is on.

THEORY OF OPERATION OF P. W. BOARDS

124-000326 PEDAL BOARD (CONTINUED) (16)

Q21 for squaring. The output of Q21 is connected to the input of a divider circuit (Q22, Q23). The output of the 16' divider is connected to the 16' pedal percussion gate through R46.

The 8' and 16' pedal filters are fed directly from the 8' and 16' percussion gates and produce a relatively "bright" pedal sound. The outputs of these filters are connected directly to the pedal tonebars.

The output of the pedal tonebars is connected to P837-5 where it is normally attenuated by R74, R75 and R77 which is normally grounded through the pedal mute switch. This attenuated signal is applied to Q24 for pre-amplification before being combined with the Lower manual signal at the input of Q25. If pedal mute is "on", P837-8 becomes ungrounded and P837-4 is grounded which adds an additional 2-stage filter to the pedal signal. This signal is not attenuated by R77 because more signal level is required to give the same apparent sound level at the speaker output.

124-000351 - UPPER MANUAL PRESET BOARD (10)

The upper manual preset board is used in LSI organs to provide nine (9) variable output voltages to control the nine (9) harmonics available from the IC Divider Keyers. The magnitude of each of the nine (9) voltages may be individually controlled by the settings of the corresponding tonebars, combinations of output voltages can be selected by the application of a control voltage(-8V typical) to any one of four (4) preset inputs, or a percussion signal can be added to any one of eight (8) percussion inputs.

TONEBAR INPUTS - A voltage that varies from 0 to -8 volts, as determined by the setting of the 16' tonebar is applied to J127-20. This negative voltage appears at the base of emitter follower Q1, which is used to provide a low impedance output for the DC tonebar voltage. The output of Q1 is connected through R13 (which is used for synthesis percussion signals) to the base of emitter follower Q2. The output of Q2 is used to provide a low impedance source for the IC divider keyer package. The voltage output from each of the other eight (8) tonebars is handled in a similar manner.

PRESET INPTUS - When a negative voltage is applied to the "Theatre Brass" input (J127-7),various voltage levels are established by divider resistor R8.R9 and R10. These voltage levels correspond to specific tonebar settings. These voltage are applied through Diodes D25 thru D33 to the inputs of emitter followers which in turn provide low impedance output voltages to control the appropriate musical pitches. The other three (3) presets function in a similar manner.

SYNTHESIS PERCUSSION INPUTS. When a positive going percussive voltage is applied to the "Glockenspiel" input (J128-7), a diode matrix routes this signal to the appropriate tonebar percussion circuit. Diode D40 is used to connect this signal to the base of Q19, which translates this voltage into a percussive current. The output current of Q19 is used to develop a percussive voltage signal across resistor R13 in the

124-000351 UPPER MANUAL PRESET BOARD (CONTINUED) (10)

16' tonebar circuit. This percussive current is added to the DC voltage supplied by transistor Q1 and is therefore unaffected by the DC tonebar control voltage. This percussion signal is then applied through Q2 to the 16' input of the divider keyer IC. The "Glockenspiel" percussion signal is also connected through D39 to the 4' percussion circuit and D38 to the 1-3/5' percussion circuit. The remaining five (5) synthesis percussion voices operate in a similar manner. There are two (2) synthesis percussion signals used which are 180° out of phase from each other. These alternating signals are used for alternating tones (during "Repeat" mode only) for the "Marimba" and "Xylophone" voices.

BIAS VOLTAGE - Resistors R1, R2 and Diode D7 provide a small bias voltage for the preset and tonebar divider resistors. This bias voltage is needed to compensate for the diode and base-emitter voltage drops in the tonebar circuits and primarily affects the low tonebar settings.

PRESET L.E.D. OUTPUT - The -8V signal which is supplied to the tonebars isalso conected to J127-6 to the input of inverter transistor Q26. The output of Q26 drives lamp amplifier Q27 which provides 15 MA of current to operate a panel mounted "Preset" L.E.D. This preset lamp is "on" whenever a preset is selected, which removes the -8 volt supply from the tonebar circuits.

124-000361 - PEDAL SYNC. (11)

This board provides the thirteen (13) pedal gates and twelve (12) sync pulse amplifiers for the 8000 organs. Both of these circuits use the pedal frequencies generated by the 124-000323 (429 IC) generator system.

The pedal gate operates in the following manner; when pedal #1 is depressed, a -27V signal (which is derived from J836-19 on the Pedal Board) is applied to J808, Pin #2. This negative voltage charges up C1 and supplies a small voltage to Q1 through resistive divider R2, R3. A staircase current generated by the "429" IC is connected to J806-13 and generates a small staircase voltage at the emitter of Q1. With Q1 "on", this staircase waveform is coupled through Q1 and the thirteen (13) pedal decoupling resistor (R6, R12 - R72, R78) to J809, Pin 6. This signal is applied to the Pedal Amp. located on the 124-000326 PWB) through J837, Pin 1.

When pedal sustain is "off", J809, Pin 5 is grounded through sustain tab and capacitor C1 will discharge through R1 and D1 to ground when pedal #1 is released. With pedal sustain "on", J809, Pin 5 becomes ungrounded and capacitor C1 will discharge through R2 and R3, causing Q1 to remain "on" for approximately 5 seconds.

The series connection of pedal gate output through a string of 13, 27K resistors forms a "high select" circuit. If pedals #1 and #2 are both depressed, only pedal #2 will be heard. The signal that appears at the collector of Q1 will be divided down through R6 and R10, while the output of Q2 will still be at full amplitude. Transistors Q3 through Q13 form the pedal gates for pedals #3 through #13.

Transistors Q14 through Q25 comprise the twelve (12) sync pulse amplifiers. The sync amplifiers are used to

124-000361 - PEDAL SYNC (CONTINUED) (11)

synchronize the twelve (12) "380" IC's (upper manual synthesis generator) to the four (4) "429" IC's. The pedal output frequencies from the "429" generator are switched to the IC operating mode when pedals are not depressed. This waveform is coupled through R114 and differentiated by capacitor C25. Whenever the input waveforms make a positive going transistion, a short positive pulse is applied to the base of Q25, thus turning Q25 "off", generating a -14V, 15 micro second pulse at J807, Pin 2. If a pedal were being depressed, there would be a negative voltage at J809, Pin 7, causing Q26 to saturate and clamp the output of Q25 approximately 0.8V through diode D25. All twelve (12) sync. circuits are identical to that described above.

124-000362 LOWER MANUAL BUS AMP BOARD (6)

This PWB Assembly is comprised of the following circuits: Four (4) L/M Bus Amplifiers, seven (7) L/M Voicing Filters and a Sync. Control signal inverter.

Transistor Q1 is a grounded base amplifier which is used to provide a low impedance for the 1' signal currents generated by the 124-000323 Generator PWB. This signal is coupled through C1 to the emitter of Q1. The output of Q1 appears at the collector as a staircase signal approximately 2.5V P-P. The output of Q1 is coupled through C2 to the 1' mellow Filter Network. The output is also coupled through R9 to provide a 1' component to the 2' bright filter and through R18 to provide a 1' component to the 4' bright filter.

Transistor Q2 is the 2' bus amplifier and its operation is identical to that of transistor Q1. This stage provides a 2' square wave through resistor R10 of transistor Q1. This stage provides a 2' square wave through resistor R10 where it is combined with a 1' square wave to form a 2 element (4 step) staircase wave form. This wave form is coupled through C6 and R12, the 2' Bright Filter. The output of transistor Q2 is also coupled to the 2' mellow filter through capacitor C7 and provides a 2' component for the 4' Bright Filter, 8' Mellow and 8' Bright Filters.

Transistors Q3 and Q4 operate similar to Q1 and Q2 with Q3 providing a 4' square wave for the 4' Bright and Mellow Filter and Q4 feeding the 8' Mellow and Bright Filters.

Transistor Q5 is an inverter for the negative sync. control input signal. The output of Q5 is connected to the pedal control input of the 075-000429 IC on the 124-000323 Generator Board. This signal changes the pedal output frequency from 8' to 16'. When this output signal is -28V (no pedal depressed), the pedals are at 16' and provide sync signals (sync circuits located on the 124-000361 PWB) to the 075-000380 IC's on the 124-000321 Generator Board.

Whenever a pedal is depressed, the output of Q5 becomes grounded and the 075-000429 pedal output frequencies return to the 8' frequency.

124-000364 & 124-000365 PERCUSSION KEYER #1 & PERCUSSION KEYER #2 (4) (5)

These two (2) board assemblies provide forty-four (44) convertible percussion time constant circuits for the Upper Manual Bright Percussion Voices and also provide isolation Diodes for the Upper Manual sustainable time constant circuits.

124-000364 & 375 PERCUSSION KEYERS (CONTINUED) (4) (5)

Diode D1 is the isolation Diode used to isolate the sustain time constant for key #1 on the 124-000321 Generator PWB.

The percussion time constants can operate in percussion or non-percussion modes, depending on convert bus. In the percussion mode the convert bus (J814, J815, Pin 2) is grounded. When an Upper Manual key is depressed, -28V is applied to the junction of RL-C1. Capacitor passes the initial spike as the key closes. As the key remains closed, resistors R2 to R4 drain off the charge on the keyer side of C1 toward the cut-off bias voltage. (Bias adjustment is located on the 124-000326 PWB and is connected to the sustain 4 bus). If the key is released immediately after it is played, capacitor C10 will discharge through these same resitors to give a short key-up tail to the note. Diode D4 prevents discharging through the input circuit. Resistor R5 is used in conjunction with capacitor C2 to slightly slow down the attack time to prevent "key click". When "Sustain 1" and sustain 3" bus levers are returned to the cut-off bias voltage, the short "Pizzicato" time constant is in use. When "sustain 1" bus is returned to -14V a "Medium" time constant is in effect for Banjo percussion. When "sustain 3" line is opened also, a long time constant is in effect for Piano and Harpsichord. When "Sustain 1" is returned to -14V, a short pulse is produced at the beginning of the percussion envelope which simulates a "strike" tone and allows fast repeats, even with long sustain effects such as Piano.

When the "convert Bus" is opened, the percussion keyer performs a straight-through keying function. Resistor R1 and Diode D3 provide for fast discharging of C1 for "straight" keying. Diode D2 provides isolation between keyers in this mode.

All keyes on these two boards are identical in operation. The only difference between keyer is the length of the time constant, which is varied by changes in values of C1 and C2.

124-000376 - MIXER #2 BOARD (17)

Mixer PWB #2 (124-000376) is used to provide swell pedal contouring for Main and Tremolo channels, mixing of upper and lower manuals into Tremolo, and mixing of Percussion and Rhythm channels into the Main channel. Volume soft for the Main and Tremolo channels and Brilliance for the upper manual circuits are also located on this board.

MAIN CHANNEL - The upper manual signal is received at J143-5 and Q13, an emitter follower stage which provides for Brilliance control at J143-4. The signal exits at J143-1 and is passed either to J143-9 or J143-12 through the "Tremolo on Upper" tab in the organ. J143-9 and J143-10 receive upper and/or lower manual signals respectively from the organ Tremolo tabs and apply them to CE Amplifier Q1 for "Main Channel" routing. At J144-8 signals from J143-2 are received and mixed with Rhythm signals entering at J144-9, and Percussion Filter signal entering at J144-10. C15 then couples these signals to the base of CE Amplifier Q6, through the collector to the base of Q7. The Swell Pedal photocell controls signal level from J144-7 by varying the impedance from that pin to ground. Series resistor R59 is used to dampen a tendency to oscillate due to external wire characteristics. Emitter follower Q7 then passes the signal out J144-6 and into J143-14.

124-000376 - MIXER #2 BOARD (CONTINUED) (17)

Main Channel volume soft circuit. When J144-2 is grounded, the voltage-divider action of R25 and C21, R27 provide frequency dependent roll off known as "Volume Soft at J143-13.

TREMOLO CHANNEL - Signal inputs for the Tremolo Channel arrive at J143-12 and/or J143-11 from the upper and lower Tremolo tabs respectively, through CE Amplfiier. Q2 (Base to Collector) and through C8, R17 to the Tremolo Volume Soft. A ground applied to J144-1 provides a frequency dependent roll-off as in the Main Channel. The signal is then amplified by CE Amplifier. Q3 passes through emitter follower Q4, and exits at J143-7. Swell Pedal action at J143-8 is the same as described for Main Channel.

124-000377 MIXER BOARD #3 (18)

Mixer PWB #3 is used to provide final mixing before the power amplifier,phono pre-amplification, tremolo filter, and swel pedal contouring for rhythm white noise voices.

The final mixers for both Main and Tremolo channels have a low enough output impedance to drive a 5K ohm external lead in addition to the organ power amplifier so that they can be used to drive tone cabinets.

124-000379 - SEE AUTO VARI THEORY (PAGE 3-31) (21)

124-000380 - SEE AUTO VARI THEORY (PAGE 3-31) (22)

124-000409 REPEAT OSCILLATOR AND DETECTOR BOARD (13)

The Repeat Oscillator and Detector senses when any upper manual keys have been played and activates Legato and Touch circuitry which produces outputs to generate repeat and alternate repeat percussion keying signals. The legato pulse generator for the lower manual is also located on this assembly.

Transistor Q1 is the Upper Manual Key-down detector When no keys are played, Q1 is biased off, terminal 15 is near -28V.

If any keys are played, current applied through Q1 Base Emitter and R2 turns on Q1 and it collector drops to -26.5V, firing monostable multivibrator Q3 and Q4. A negative going pulse from the collector of Q4 enters the "OR" gate at D1, along with negative voltage from the collector of Q1 through D2, and is applied to the base of Q5, causing terminal 19 to go to -28V.

The monostable responds to all upper manual key closures by generating a -28V pulse.

REPEAT OSCILLATOR AND KEYERS

When no keys are being played, Q7 is conducting, keeping C5 discharged. Upon playing any key, Q7 is biased off, and C5 starts charging through R14 and the repeat rate potentiometer. Q8 does not conduct until C5 charges to a specific voltage, then Q8 turns on and quickly discharges C5. The resulting current flow through R15 produces a pulse which is amplified by Q9 and used to trigger keying bistable multivibrator Q11 and Q12.

The repeat oscillator can also be turned on by application of -24V at Pin 21. This voltage turns off Q7 and allows C5 to charge.

124-000409 REPEAT OSCILLATOR AND DETECTOR BOARD (CONT'D) (13)

The keying multivibrator remains in the state it is in when the last key is released. Subsequent playing of a key causes negative voltage at terminal 19 to be transmitted through D9 to the multivibrator, setting it to the state where Q11 is off with its collector at zero voltage and Q13 is on with its collector at -14V. Should the multivibrator already be in this state, it will remain there. After the initial pulse via D9, each succeeding pulse from Q9 will change the state of the multivibrator. Positive going voltage changes at the collector of Q11 are differentiated and applied to the base of Q10. The negative pulse output at the collector of Q10 charges the timing capacitor C15 through Diode D13. If the rest state of the multivibrator is such that the collector of Q11 is positive, no pulse is present to drive Q10 when the first key is played. To insure the availability of a drive pulse, a signal is coupled from the collector of Q6 through D4 and C7 to the base of Q10. (Q6 produces a positive pulse with the first key-down). C15 starts to discharge rapidly through D14 and R35 toward a voltage level determined by voltage divider R32 and R33. As the voltage divider at C15 become more positive than the voltage set by R32 and R33, D14 cuts off and C15 continues to discharge at a much slower rate through R40. The initial rapid discharge gives uniform duration of notes at fast repeat rates and keeps notes from sounding too short at slow repeat rates. Q16 and Q17 make up a Darlington amplifier with a high input impedance which provides a low output impedance to drive the Synthesis Percussion Gate circuitry in the repeat mode. The positive going output at the collector of Q12 is used in a similar manner, along with Q13, Q14 and Q15 to drive the Synthesis Percussion Gates circuitry for the alternate notes in the Xylophone and Marimba voices.

TIME CONSTANT CONTROL

When a polyphonic percussion system is activated, each note has its own percussion keyer. When played, notes die away even if keys are held down. When repeat is used, however, keyers must convert from percussion to normal mode so that as long as keys are down, enough signal is present for the repeat keyer to turn on and off. With the Repeat tab "ON", no connection is made to terminal 8, Q21 and Q22 are off and terminal 13 is at about -28V. This voltage applied to convertible keyers puts them in normal mode. When the Repeat tab is "OFF", Q21 and Q22 conduct, bringing terminal 13 near zero volts which places convertible keyers in percussion mode. Pressing the Piano Solo tab applies -8V to terminal 10 putting the convertible keyers in perucssion mode, overriding the Repeat tab.

Q23 and Q24 make up a monostable multivibrator for use as a lower manual legato detector. Q23 is normally conducting, holding Q24 off. When a lower manual key is played, the voltage across R54 triggers the circuit causing Q24 to generate a negative pulse at terminal 9. This action repeats for each additional key until 15 or 20 are played. Capacitor C22 is used to vary the sensitivity of this circuit, depending upon the loading of the lower manual keyers in various organs.

124-000415 - ARPEGGIATOR BOARD (12)

The Arpeggiamatic circuit consists of two transistors, four resistors, and forty-four diodes. The transistors are used for gating keying signals, the diodes are used for steering these signals, and the resistors are for biasing. The circuit operates on a -28V supply. There

124-000415 - ARPEGGIATOR BOARD(CONTINUED) (12)

two connectors, one for inputs from the lower manual and one for outputs to the Arpeggiator keying PWB.

The Arpeggiator Assembly produces an Arpeggio, A Glissando, or a whole tone scale of notes, automatically whenever it is stroked. The Arpeggiator is controlled by twenty of the keys on the lower manual. Depressing the lower manual keys determine which keys in the Arpeggiator are live (will play) and which are dead. The tones played will be those registered for the upper manual. In the Glissando mode, all keys in the Arpeggiator are live. This occurs when no keys in the lower manual keyboard are being held. If one or more of the twenty keys in the lower manual is being held and all are within one of the whole tone scales, all of the keys in the Arpeggiator representative of the same whole tone scale are live. Those for the other whole tone scale are dead. If several keys are held in the twenty keys which represent notes in both whole tone scales, as is true of most chords for instance, then all keys in the Arpeggiator will be dead excepting those representative of the notes held in the control keyboard or those in octave relation thereto.

The Arpeggiamatic Board is the automatic control for the Arpeggiator. Transistors Q1 and Q2 are normally turned on by base resistors R2 and R3 when no keying busses are activated (no keys held down on the lower manual). This applies -18 volts to all the keying busses from the emitters, through the collectors and diodes D1 to D6 and D19 to D24. This activates all of the busses at slightly less than the full keying voltage. When the Arpeggiator on the lower manual in the same whole tone scales are held down, this will apply -28 volts to the base of this transistor through the diodes, turning it off and removing the -18 volts from the busses for the other whole tone scale. Thus only the proper whole tone scale in tune with the note(s) depressed will play when the Arpeggiator is stroked. If a chord is being played on the lower manual which has notes in both whole tone scales, busses are activated with -28 volts on both left and right sides, back biasing both transistors so that only the busses for the notes held down are activated. Only these notes will now play as the Arpeggiator is stroked. Thus, it can be seen that the automatic feature plays a Glissando when no keys are held, and a pleasing Arpeggio when one or more notes are held, always in harmony with the notes being held. The "(auto)" switch breaks the ground connection on the automatic part of the board to render it inoperative. In the manual mode, only the notes activated on the lower manual and the octavely related note will play when the Arpeggiator is stroked.

124-000418 - SEE AUTO VARI THEORY (PAGE 3-31) (23)

124-000425 - U.M. SYNTHESIS PERCUSSION (14)

The upper manual synthesis percussion PWB provides the legato percussion time constant circuitry, repeat gating, and various other percussion switching functions, as well as the bright percussion amp and unitary piano filter.

When an upper manual key is played, a legato pulse is generated on the 124-000409 board and it is connected to J125-2. C1 and C2 are charged in series through D2. C1 discharges quickly through D1, while C2 discharges through R3 or R4 and R5, depending on the sustain length selected. R3 is returned thru D3 to a negative voltage to provide a two slope decay for better performance. J125-5 is grounded for Pizzicato, J125-3 and 4 are shorted for Glock, Xylo, and Marimba, and J125-

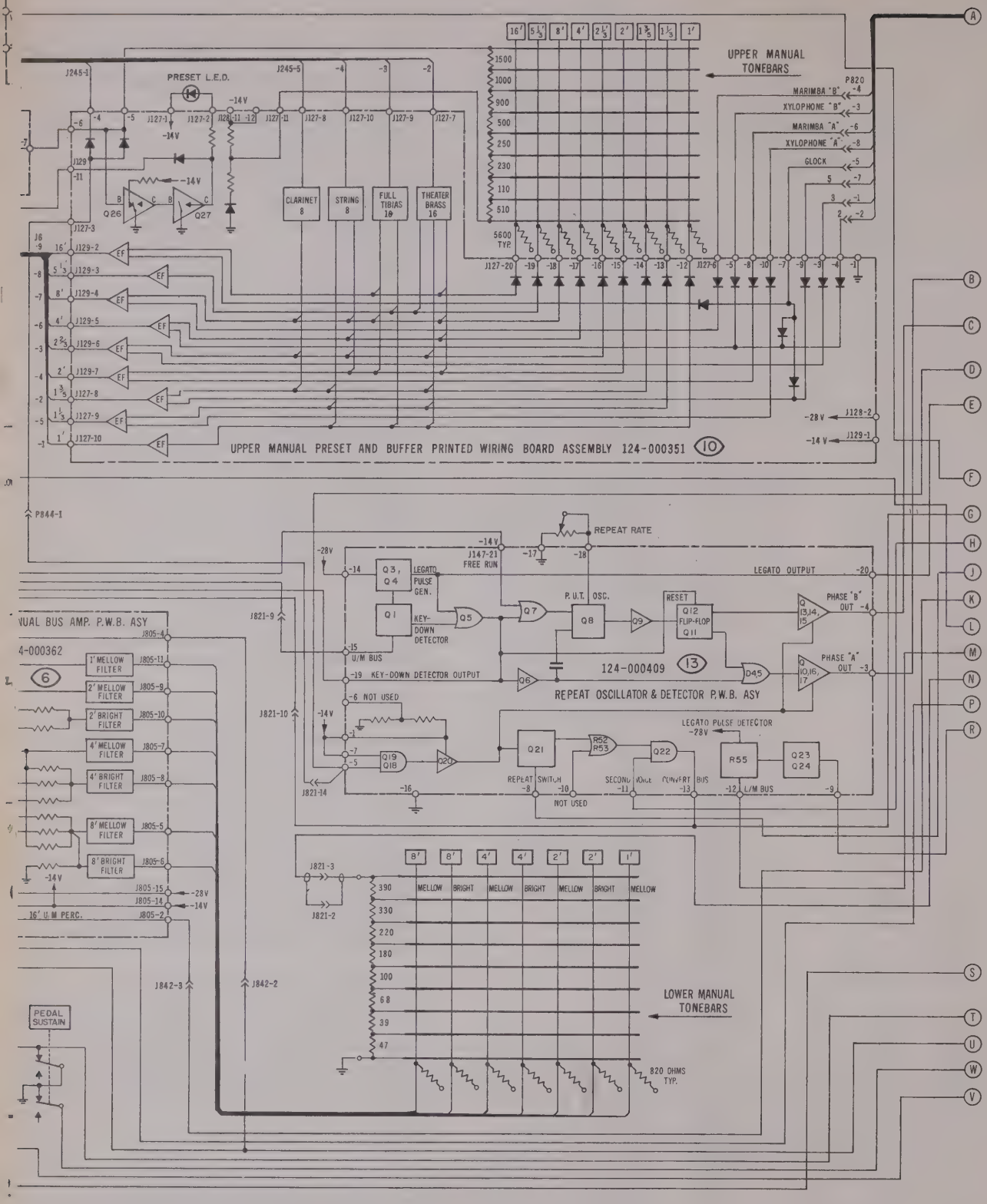
124-000425 U.M. SYNTHESIS PERCUSSION (CONTINUED) (14)

3 and 4 are open on single harmonic percussions. R11 is a cutoff bias adjustment that gives a smooth decay without pinchoff. The output of Q1 is a negative going waveform nearly 14V in amplitude and is coupled to the bases of Q4 and Q5 through D4 and D5 if the Repeat tab is off. Turning Repeat on grounds the junction D4 and D5. Q4 and Q5 invert Q1's output and reference it to -28V. These outputs are connected to the 124-000351 upper manual preset PWB. When in the repeat mode, D8 and D9 are ungrounded, allowing the phase A & B repeat outputs to pass to the base of Q4 and Q5 and on to the preset board as did the percussion.

Q2 and Q3 form a percussion enable gate, -8 volts is supplied from the "DB and percussion" and "percussion only" piston to turn Q3 off and allow percussion and repeat to function. Q7 is used to restore the organ to percussion mode for piano solo if 2nd voice is on. Q8 cancels vibrato for piano solo. Q6 reduces the DC level applied to the bright percussion gate on the 124-000208 board in 2nd voice mode to match the audible level of percussion and 2nd voice.

This board also contains a bright bus amp and piano filter. The stairstep wave output from the U.M. 380 I.C.'s is developed across R34 and amplified by Q9. J126-12 is connected to the bright percussion tab switches, and R40 provides controlled "robbing" between the voices. Q10 and Q11 form a band pass active filter for piano. Piano solo output is taken at a higher level. Note that the ground for the signal circuitry is separate from the control circuits ground in case it is necessary to separate them in the organ for lowest noise pickup.

An additional transistor, Q12, is used to remove sustain from the percussion when 2nd voice is on.


UPPER MANUAL TONEBARS
PRESET L.E.D.
CLARINET 8
STRING 8
FULL TIBIAS 16
THEATER BRASS 16
MARIMBA "B"
XYLOPHONE "B"
MARIMBA "A"
XYLOPHONE "A"
GLOCK
UPPER MANUAL PRESET AND BUFFER PRINTED WIRING BOARD ASSEMBLY 124-000351 (10)
REPEAT RATE
LEGATO OUTPUT
P.U.T. OSC.
RESET
FLIP-FLOP
PHASE "B" OUT
PHASE "A" OUT
KEY-DOWN DETECTOR OUTPUT
124-000409 (13)
REPEAT OSCILLATOR & DETECTOR P.W.B. ASY
LEGATO PULSE DETECTOR
LOWER MANUAL TONEBARS
820 OHMS TYP.
PEDAL SUSTAIN

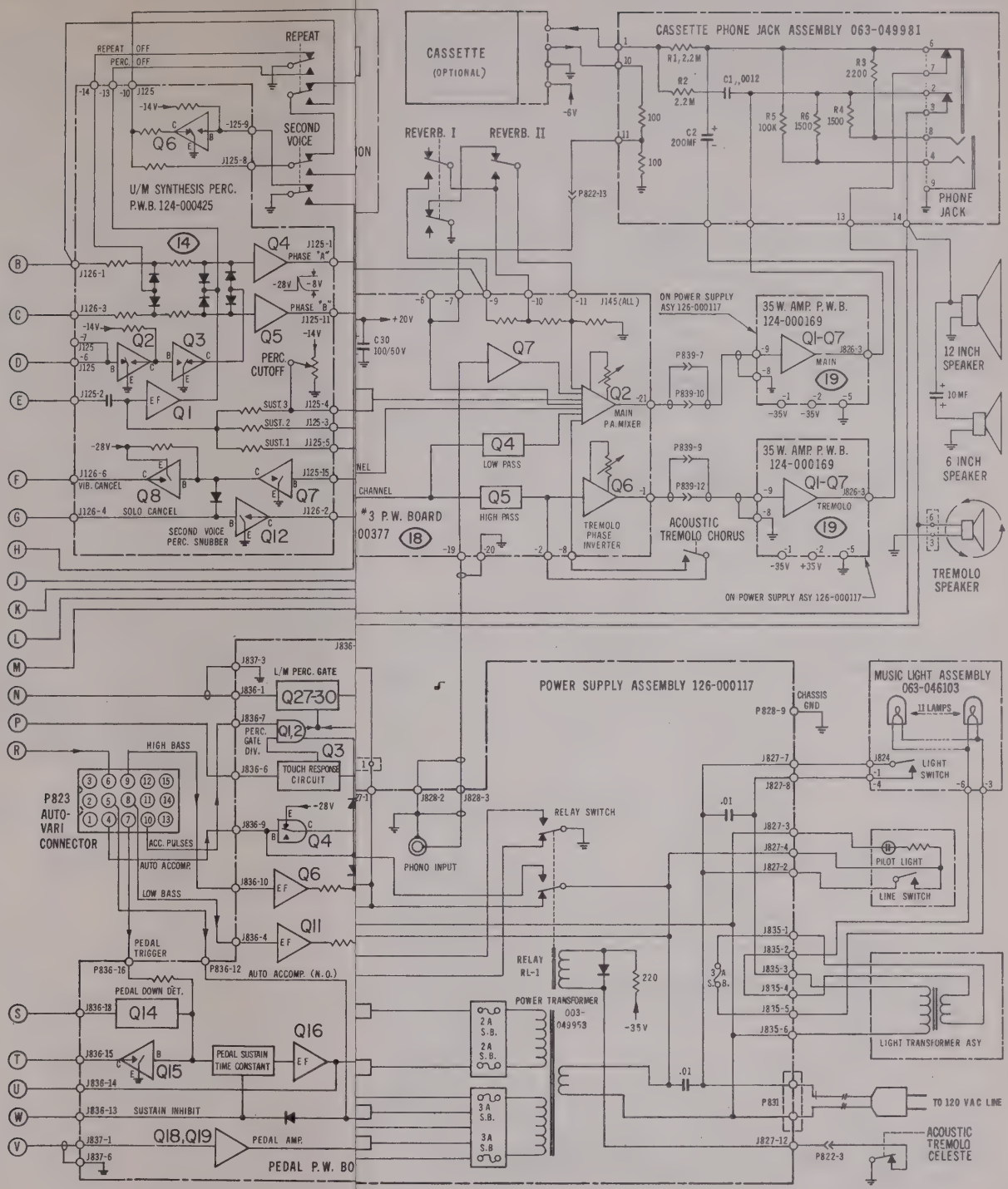


FIGURE 3-2
8200 SERIES CONSOLE
LOGIC DIAGRAM

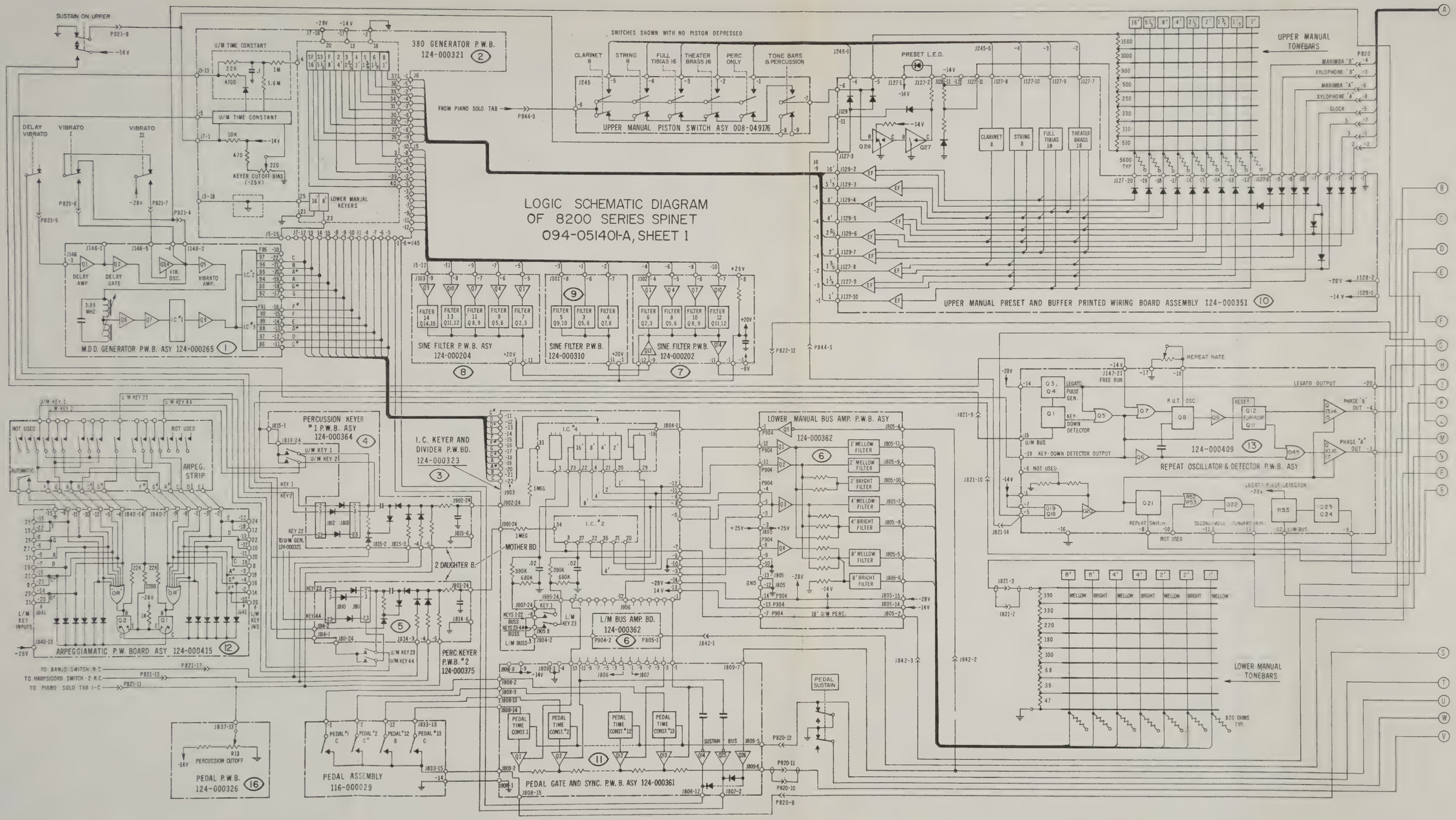
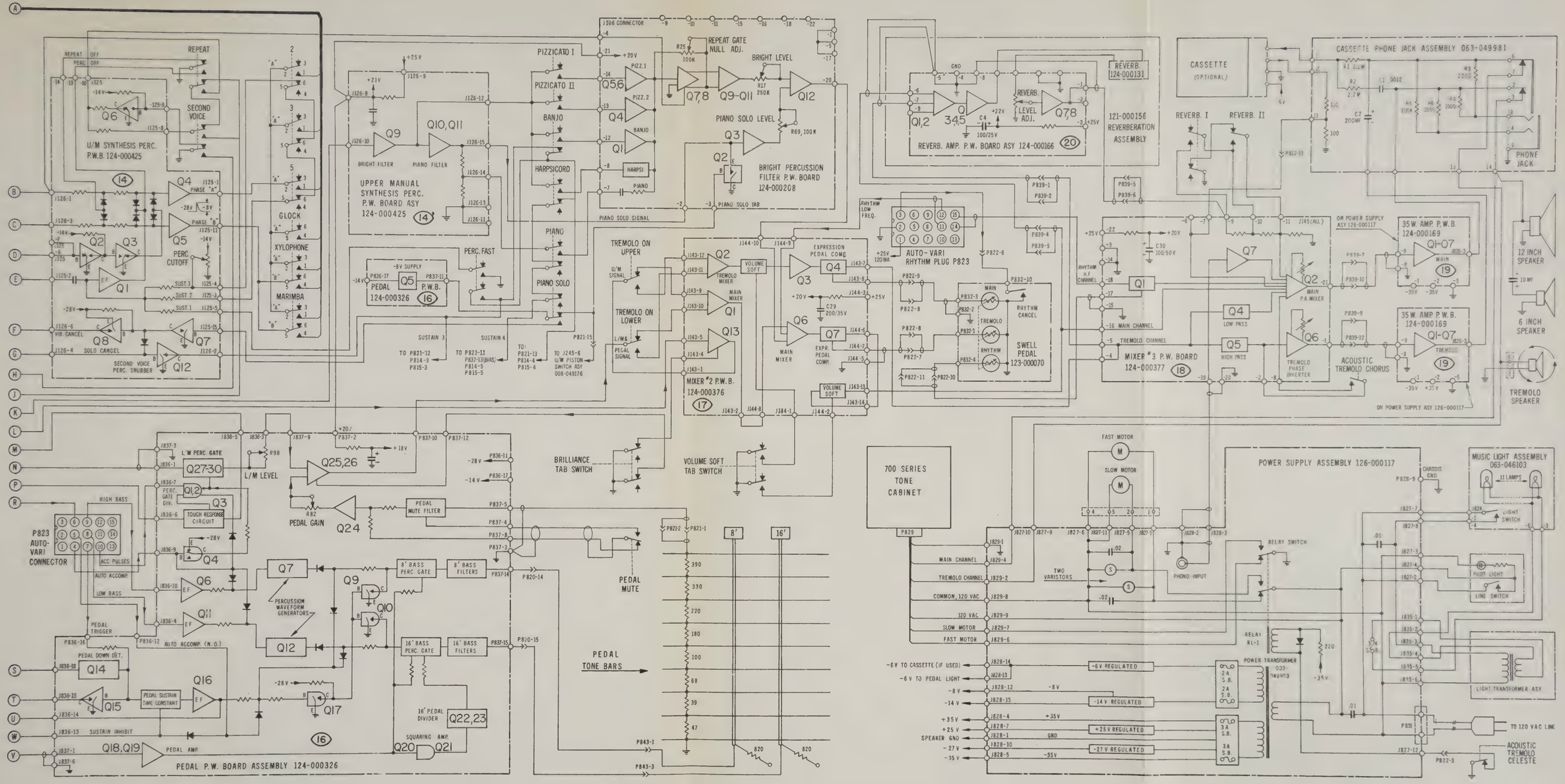
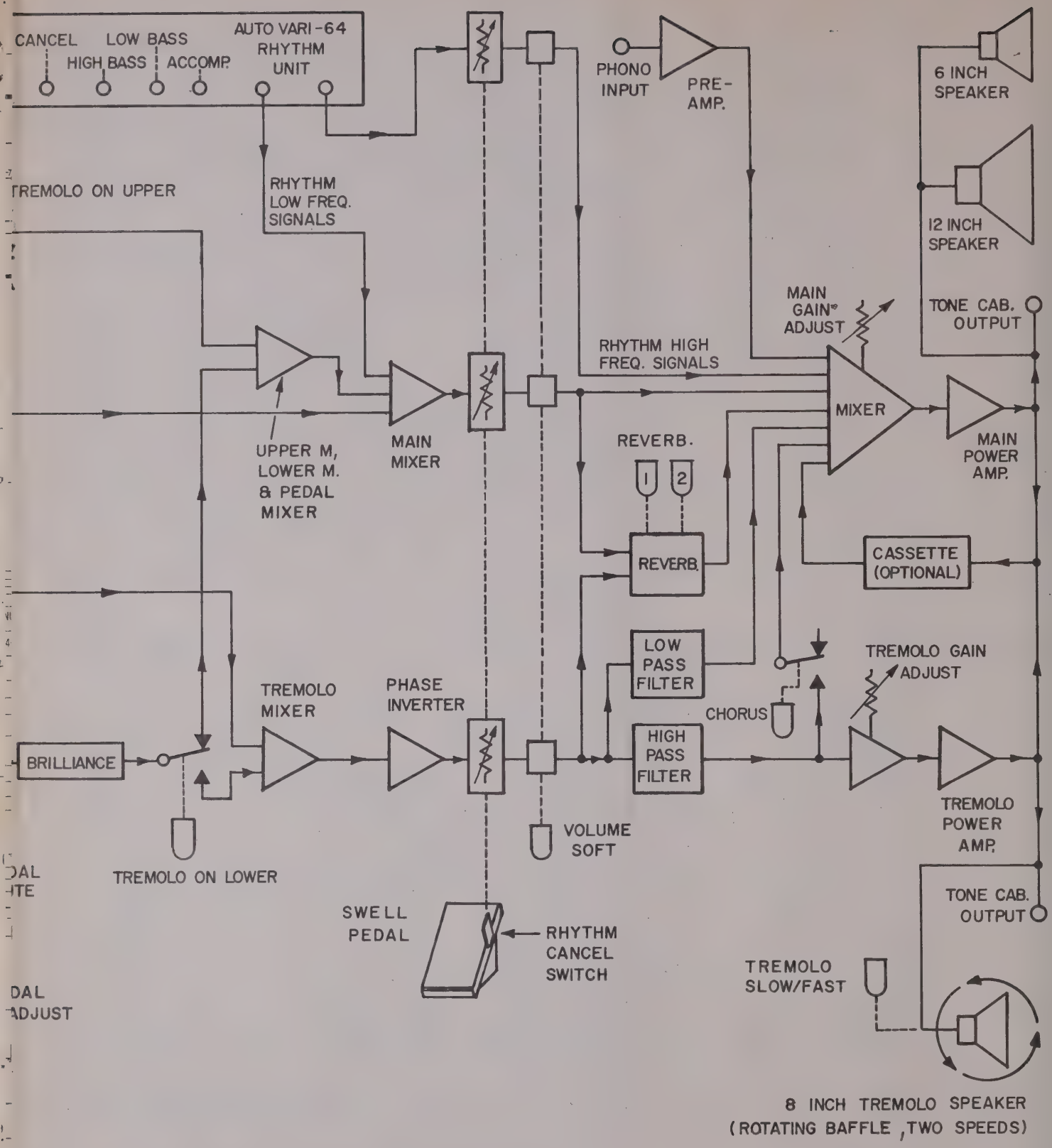


FIGURE 3-1
8200 SERIES CONSOLE
LOGIC DIAGRAM

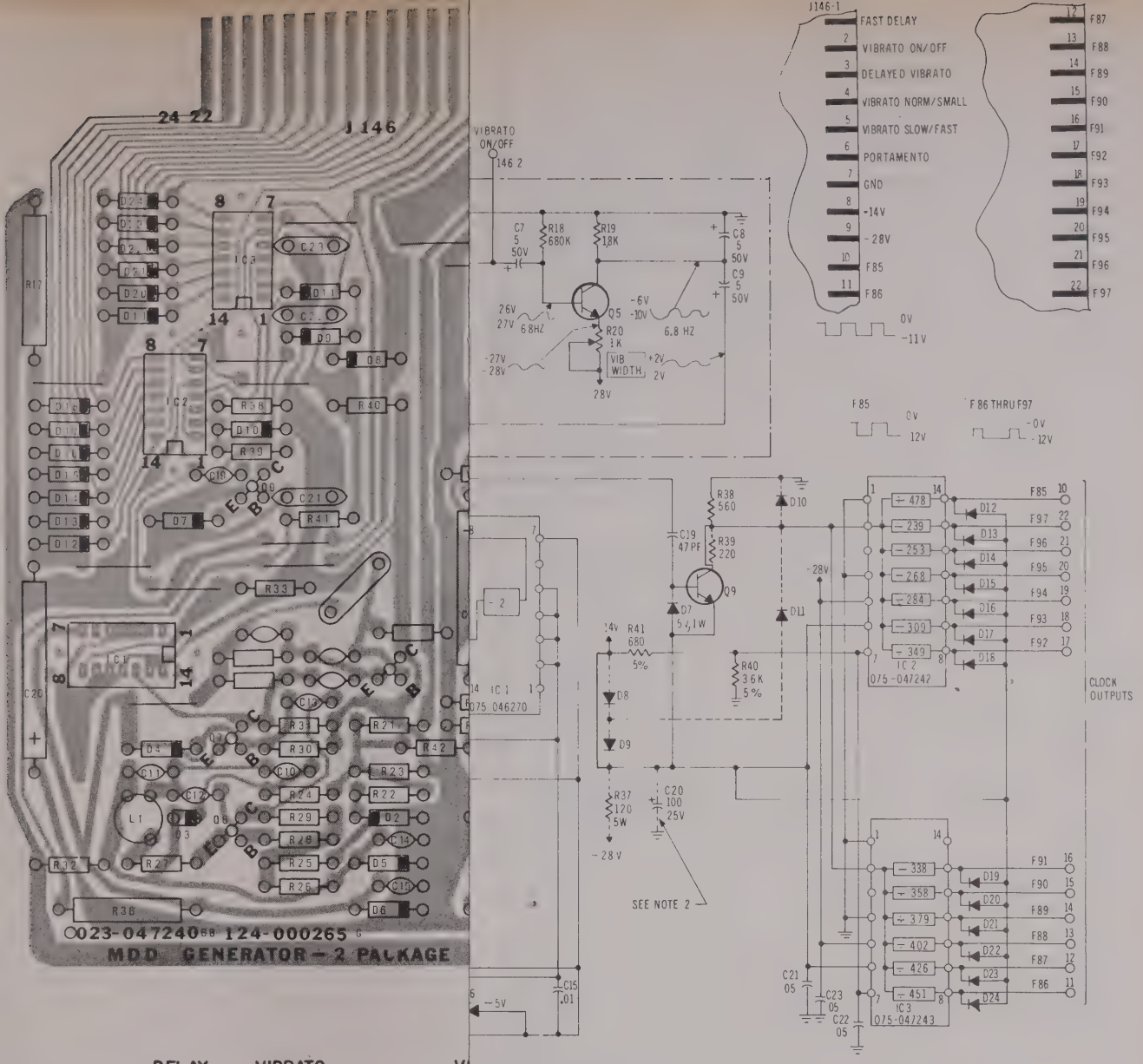


094-051401-A, SHEET 2 OF 2, LOGIC SCHEMATIC DIAGRAM OF 8200 SERIES SPINET ORGAN

FIGURE 3-2
8200 SERIES CONSOLE
LOGIC DIAGRAM



SYSTEMS DIAGRAM OF 8200 SERIES SPINET ORGAN



265, 124-000266

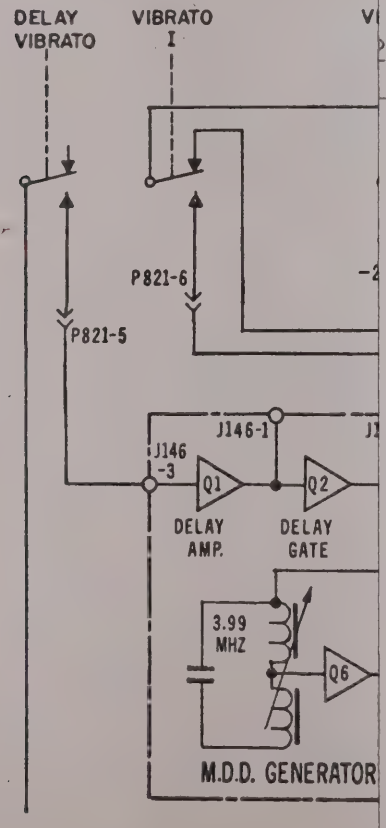


FIGURE 3-4
MDD GENERATOR BOARD
SCHEMATIC AND LAYOUT
(124-000265)

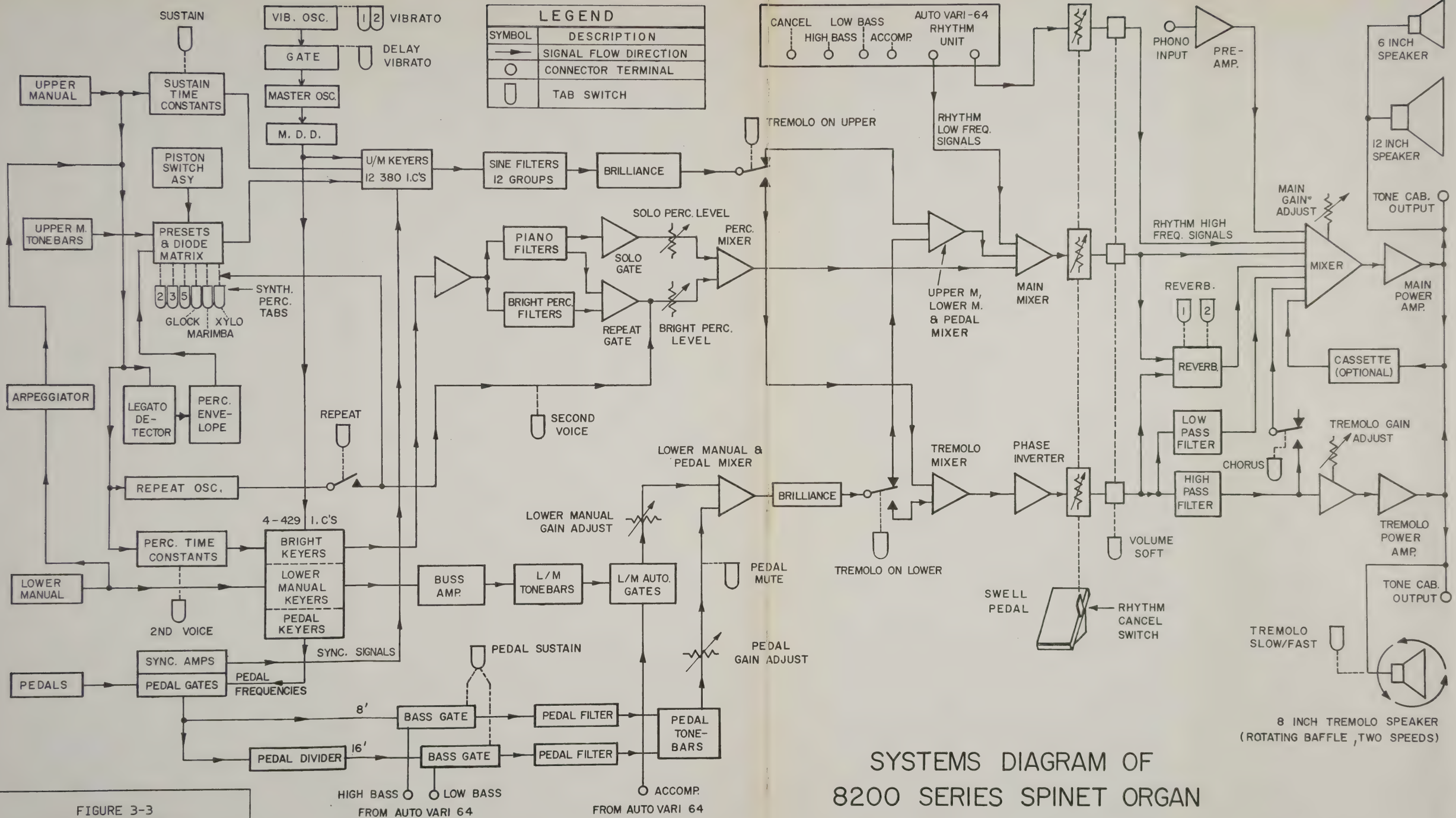
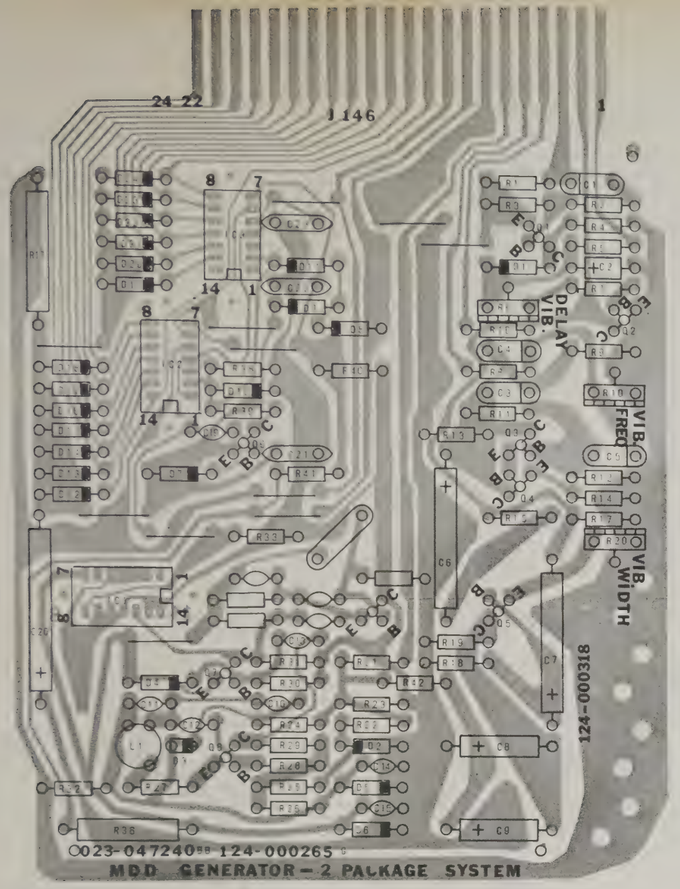
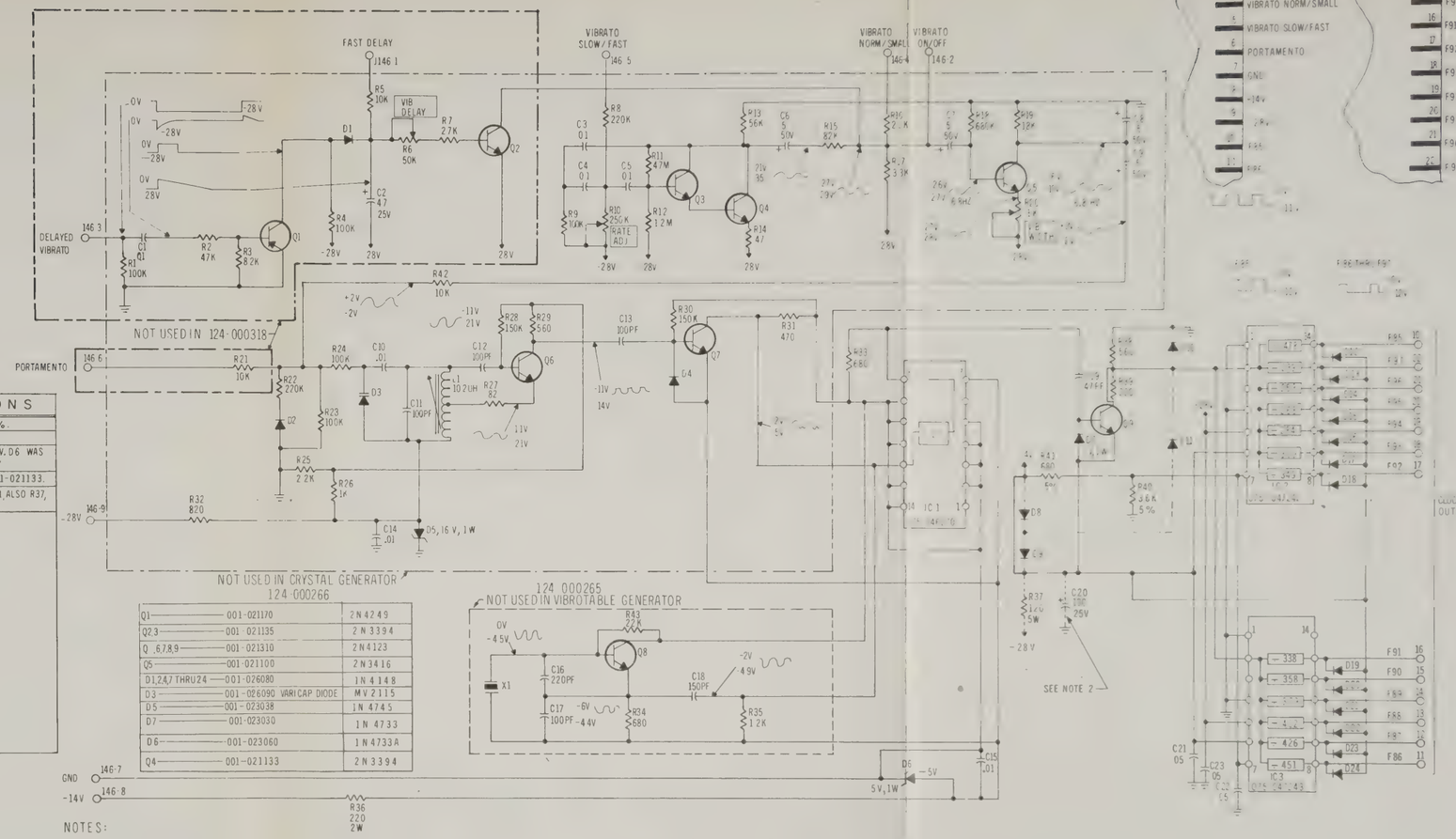


FIGURE 3-3
8200 SERIES SYSTEMS
BLOCK DIAGRAM

SYSTEMS DIAGRAM OF 8200 SERIES SPINET ORGAN

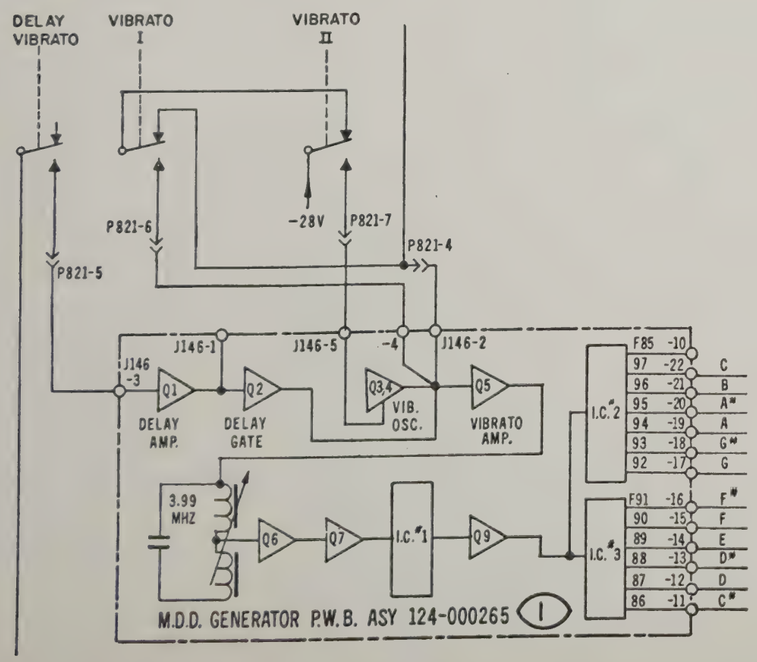


REVISIONS		
A	R41 WAS 1000Ω 5%.	
B	C6 & C7 WERE 25 V.	
C	C6 & C7 WERE 50/50 V. D6 WAS 001-223030.	
D	Q6, Q7 & Q9 WERE	001-021133.
E	DELETED D8 THRU R39 AND C20.	D11, ALSO R37,



Q1	001-021170	2N4249
Q2,3	001-021135	2N3394
Q 6,7,8,9	001-021310	2N4123
Q5	001-021100	2N3416
D1,2,4,7 THRU 24	001-026080	1N4148
D3	001-026090 VARICAP DIODE	MV2115
D5	001-023038	1N4745
D7	001-023030	1N4733
D6	001-023060	1N4733A
Q4	001-021133	2N3394

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE IN OHMS & 1/2 WATT, ±10%;
   ALL CAPACITORS ARE IN MICROFARADS.
2. COMPONENTS WITH CONNECTIONS IN DOTTED LINES WERE USED IN EARLIER MODELS, REF. REV. ISSUE "E".

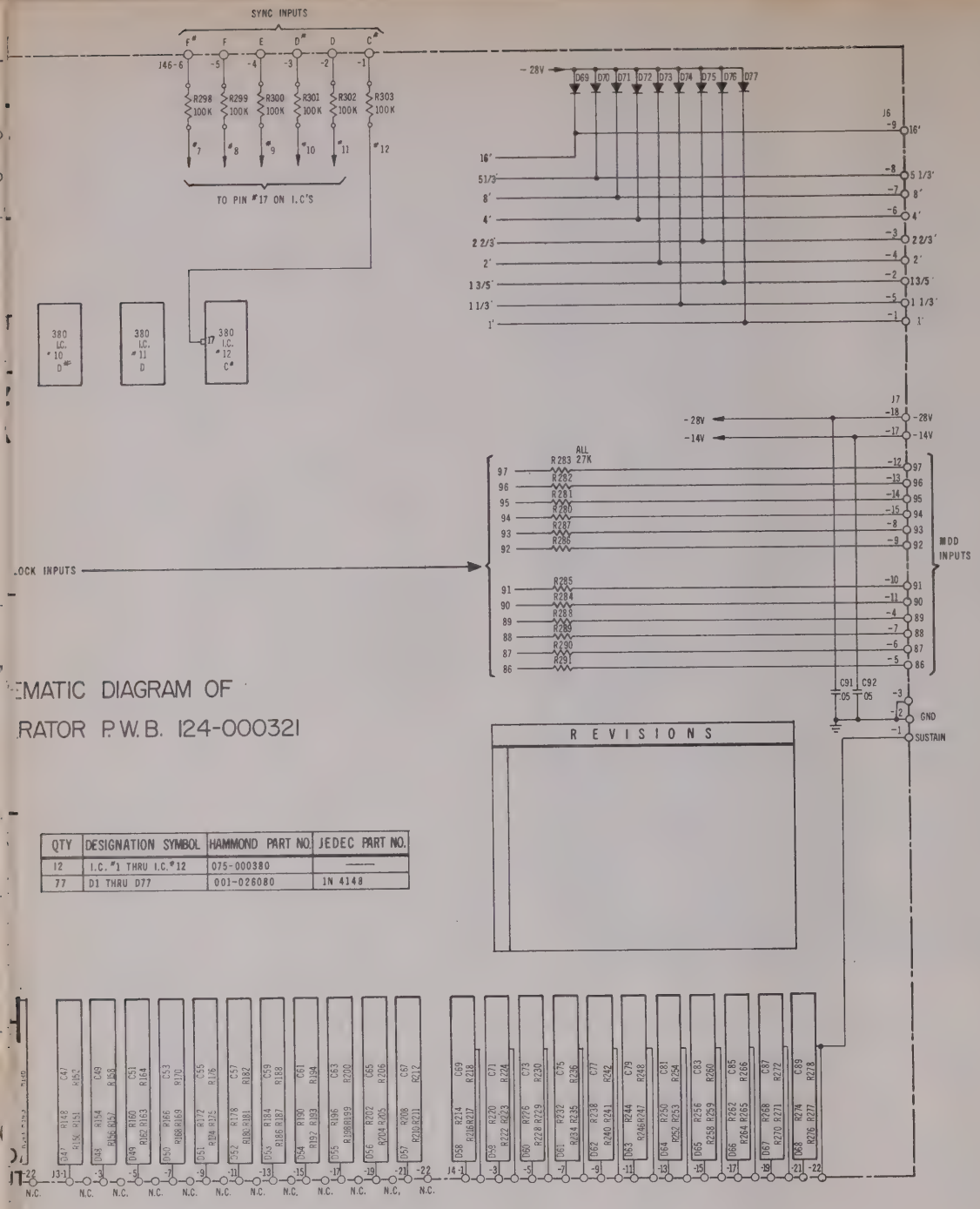


124-000318, 124-000265, 124-000266

094-047241-E

(1)

FIGURE 3-4
MDD GENERATOR BOARD
SCHEMATIC AND LAYOUT
(124-000265)



EMATIC DIAGRAM OF
RATOR P.W.B. 124-000321

QTY	DESIGNATION SYMBOL	HAMMOND PART NO.	JEDEC PART NO.
12	I.C. #1 THRU I.C. #12	075-000380	——
77	D1 THRU D77	001-026080	1N 4148

REVISIONS

DNERATOR P.W.B.
000321 (2)

NOTE:

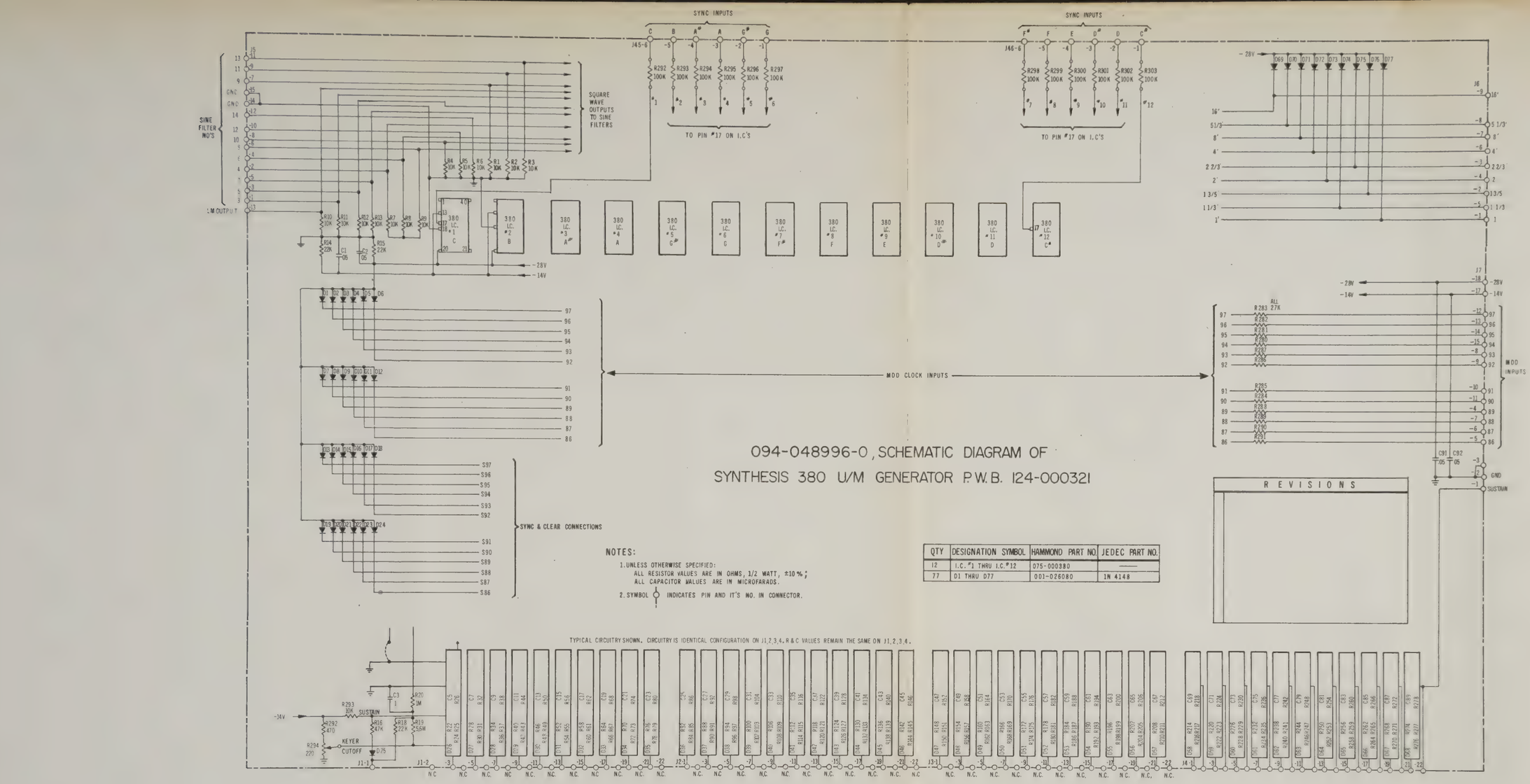
DIODES - D-1 THRU 24 AND D69 THRU 77 NOT USED.

→ TO U/M PRESET BOARD
124-000351

→ TO FILTER BOARDS

I.C. PIN	C 1	B 2	A# 3	A 4							
					V	-28V	-28V	-28V	-28V	-28V	-28V	VGG SUPPLY (J7-18)
					GROUND							16' L.M. OUTPUT
					15 20	KEY 14 J3-6	KEY 13 J3-14	KEY 12 J3-22	KEY 11 J4-6	KEY 10 J4-12	KEY 9 J4-18	2ND OCTAVE L.M. KEY INPUT
1	(F8) J5-6	(F7) J5-5	(F7) J5-5	(F7) J5-5	13	J5-13	J5-13	J5-13	J5-13	J5-13	J5-13	8' L.M. OUTPUT
2	(F10) J5-8	(F9) J5-7	(F9) J5-7	(F9) J5-7	39 22	KEY 38 J3-8	KEY 37 J3-16	KEY 36 J4-2	KEY 35 J4-8	KEY 34 J4-14	KEY 33 J4-20	4TH OCTAVE L.M. KEY INPUT
3	(F12) J5-10	(F11) J5-9	(F11) J5-9	(F11) J5-9	3 2	KEY 2 J3-10	KEY 1 J3-18			GROUND		1ST OCTAVE L.M. KEY INPUT
4	KEY 8 J1-1	KEY 7 J1-9	KEY 6 J1-17	KEY 5 J2-3	1	J6-1	J6-1	J6-1	J6-1	J6-1	J6-1	1' TONEBAR INPUT
5	(F14) J5-12	(F13) J5-11	(F13) J5-11	(F13) J5-11	5	J6-5	J6-5	J6-5	J6-5	J6-5	J6-5	1-1/3' TONEBAR INPUT
6	(F14) J5-12	(F14) J5-12	(F14) J5-12	(F14) J5-12	2	J6-2	J6-2	J6-2	J6-2	J6-2	J6-2	1-3/8' TONEBAR INPUT
7	KEY 32 J1-3	KEY 31 J1-11	KEY 30 J1-19	KEY 29 J2-5	27 4	LEY 26 J3-12	KEY 25 J3-20	KEY 24 J4-4	KEY 23 J4-10	KEY 22 J4-16	KEY 21 J4-22	3RD OCTAVE L.M. KEY INPUT
8	KEY 20 J1-5	KEY 19 J1-13	KEY 18 J2-21	KEY 17 J2-7								
9	S89	S88	S87	S86	4	J6-4	J6-4	J6-4	J6-4	J6-4	J6-4	2' TONEBAR INPUT
10	C89	C88	C87	C86	3	J6-3	J6-3	J6-3	J6-3	J6-3	J6-3	2-2/3' TONEBAR INPUT
11		GROUND			39 3	KEY 38 J3-11	KEY 37 J3-19	KEY 36 J4-3	KEY 35 J4-9	KEY 34 J4-15	KEY 33 J4-21	5TH OCTAVE U.M. KEY INPUT
12	C92	C91	C90	C89	GROUND							1ST OCTAVE U.M. KEY INPUT
13	-14V	-14V	-14V	-14V	6	J6-6	J6-6	J6-6	J6-6	J6-6	J6-6	4' TONEBAR INPUT
14	S97	S96	S95	S94	7	J6-7	J6-7	J6-7	J6-7	J6-7	J6-7	8' TONEBAR INPUT
15	S92	S91	S90	S89	8	J6-8	J6-8	J6-8	J6-8	J6-8	J6-8	5-1/3' TONEBAR INPUT
16			GROUND		9	J6-9	J6-9	J6-9	J6-9	J6-9	J6-9	16' TONEBAR INPUT
17	J-45 -6	J-45 -5	J-45 -4	J-45 -3	GROUND							
18					) 3	(F5) J5-3	(F4) J5-2	(F4) J5-2	(F4) J5-2	(F4) J5-2	(F4) J5-2	SQUARE WAVE OUTPUTS TO SINE FILTERS.
19	C97 J7-12	C96 J7-13	C95 J7-14	C94 J7-15	) 1	(F3) J5-1	(F3) J5-1		GROUND			

FIGURE 3-6
GENERATOR BOARD
CHART - I.C. CONNECTIONS
(124-000321)


SYNC INPUTS
SYNC INPUTS
SINE FILTER NO'S
SQUARE WAVE OUTPUTS TO SINE FILTERS
TO PIN #17 ON I.C.'S
TO PIN #17 ON I.C.'S
U/M OUTPUT
MOD CLOCK INPUTS
MOD INPUTS
SYNC & CLEAR CONNECTIONS
TYPICAL CIRCUITRY SHOWN. CIRCUITRY IS IDENTICAL CONFIGURATION ON J1,2,3,4. R & C VALUES REMAIN THE SAME ON J1,2,3,4.

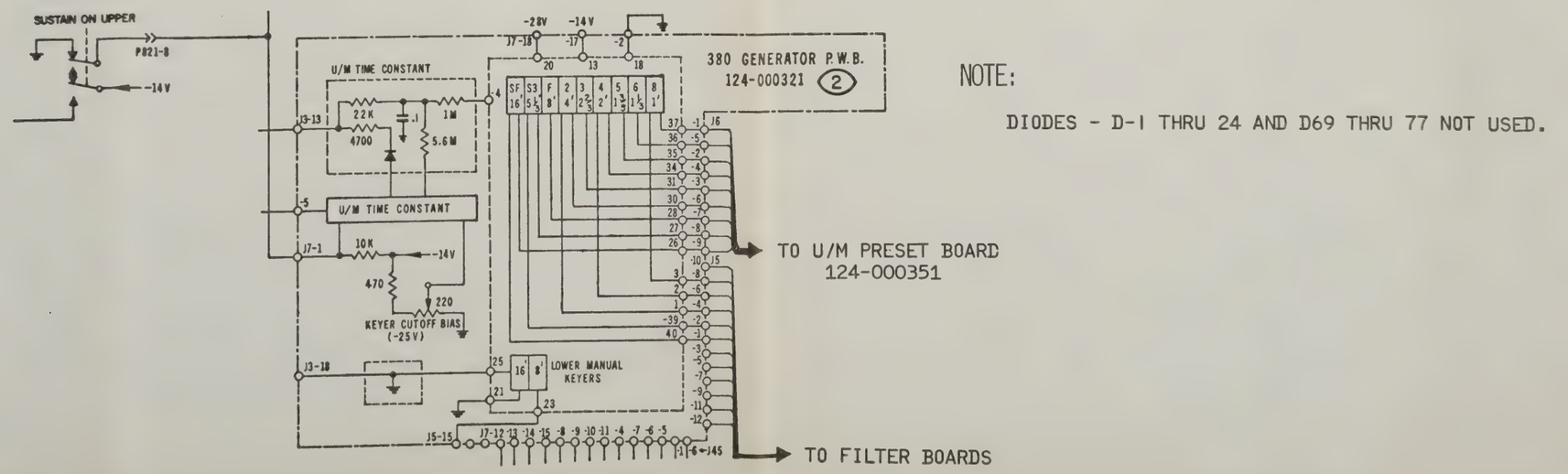
094-048996-0, SCHEMATIC DIAGRAM OF SYNTHESIS 380 U/M GENERATOR P.W.B. 124-000321

REVISIONS

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±10%;
   ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. SYMBOL ⏚ INDICATES PIN AND IT'S NO. IN CONNECTOR.

QTY	DESIGNATION SYMBOL	HAMMOND PART NO.	JEDEC PART NO.
12	I.C. #1 THRU I.C. #12	075-000380	——
77	D1 THRU D77	001-026080	1N 4148



NOTE:

DIODES - D-1 THRU 24 AND D69 THRU 77 NOT USED.

(2)

FIGURE 3-5
GENERATOR BOARD
SCHEMATIC, AND THEORY
(124-000321)

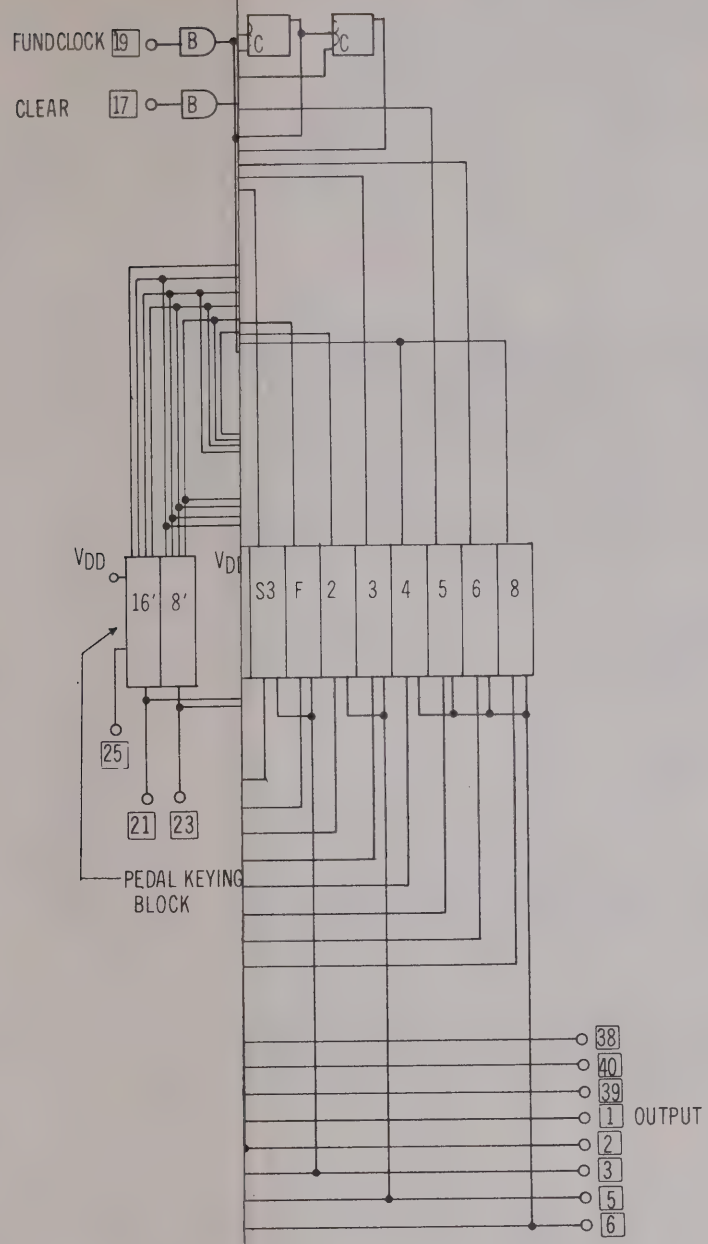
I.C. CONNECTIONS

I.C. PIN	C 1	B 2	A# 3	A 4	G# 5	G 6	F# 7	F 8	E 9	D# 10	D 11	C# 12	COMMENTS
1	(F8) J5-6	(F7) J5-5	(F7) J5-5	(F7) J5-5	(F7) J5-5	(F7) J5-5	(F7) J5-5	(F6) J5-4	(F6) J5-4	(F6) J5-4	(F6) J5-4	(F6) J5-4	
2	(F10) J5-8	(F9) J5-7	(F9) J5-7	(F9) J5-7	(F9) J5-7	(F9) J5-7	(F9) J5-7	(F8) J5-6	(F8) J5-6	(F8) J5-6	(F8) J5-6	(F8) J5-6	SQUARE WAVE OUTPUTS TO SINE FILTERS.
3	(F12) J5-10	(F11) J5-9	(F11) J5-9	(F11) J5-9	(F11) J5-9	(F11) J5-9	(F11) J5-9	(F10) J5-8	(F10) J5-8	(F10) J5-8	(F10) J5-8	(F10) J5-8	
4	KEY 8 J1-1	KEY 7 J1-9	KEY 6 J1-17	KEY 5 J2-3	KEY 4 J2-11	KEY 3 J2-19	KEY 2 J3-5	KEY 1 J3-13		GROUND			2ND OCTAVE U.M. KEY INPUT
5	(F14) J5-12	(F13) J5-11	(F13) J5-11	(F13) J5-11	(F13) J5-11	(F13) J5-11	(F13) J5-11	(F12) J5-10	(F12) J5-10	(F12) J5-10	(F12) J5-10	(F12) J5-10	
6	(F14) J5-12	(F14) J5-12	(F14) J5-12	(F14) J5-12	(F14) J5-12	(F14) J5-12	(F14) J5-12	(F14) J5-12	(F14) J5-12	(F14) J5-12	(F14) J5-12	(F14) J5-12	SQUARE WAVE OUTPUTS TO SINE FILTERS.
7	KEY 32 J1-3	KEY 31 J1-11	KEY 30 J1-19	KEY 29 J2-5	KEY 28 J2-13	KEY 27 J2-21	KEY 26 J3-7	KEY 25 J3-15	KEY 24 J3-21	KEY 23 J4-5	KEY 22 J4-11	KEY 21 J4-17	4TH OCTAVE U.M. KEY INPUT
8	KEY 20 J1-5	KEY 19 J1-13	KEY 18 J2-21	KEY 17 J2-7	KEY 16 J2-15	KEY 15 J3-1	KEY 14 J3-9	KEY 13 J3-17	KEY 12 J4-1	KEY 11 J4-7	KEY 10 J4-13	KEY 9 J4-19	3RD OCTAVE U.M. KEY INPUT
9	S89	S88	S87	S86	S97	S96	S95	S94	S93	S92	S91	S-90	5TH HARMONIC CLEAR INPUT
10	C89	C88	C87	C86				GROUND					5TH HARMONIC CLOCK 2 INPUT
11		GROUND			C97	C96	C95	C94	C93	C92	C91	C90	5TH HARMONIC CLOCK 1 INPUT
12	C92	C91	C90	C89	C88	C87	C86			GROUND			3RD HARMONIC CLOCK 2 INPUT
13	-14V	-14V	-14V	-14V	-14V	-14V	-14V	-14V	-14V	-14V	-14V	-14V	VDD SUPPLY (J7-16)
14	S97	S96	S95	S94	S93	S92	S91	S90	S89	S88	S87	S86	SYNC. OUTPUT
15	S92	S91	S90	S89	S88	S87	S86	S97	S96	S95	S94	S93	3RD HARMONIC CLEAR INPUT
16			GROUND					S97	S96	S95	S94	S93	3RD HARMONIC CLOCK 1 INPUT
17	J-45 -6	J-45 -5	J-45 -4	J-45 -3	J-45 -2	J-45 -1	J-46 -6	J-46 -5	J-46 -4	J-46 -3	J-46 -2	J-46 -1	FUNDAMENTAL CLEAR INPUT
18						GROUND							I.C. GROUND
19	C97 J7-12	C96 J7-13	C95 J7-14	C94 J7-15	C93 J7-8	C92 J7-9	C91 J7-10	C90 J7-11	C89 J7-4	C88 J7-7	C87 J7-6	C86 J7-5	FUNDAMENTAL CLOCK
20	-28V	-28V	-28V	-28V	-28V	-28V	-28V	-28V	-28V	-28V	-28V	-28V	VGG SUPPLY (J7-18)
21						GROUND							16' L.M. OUTPUT
22	KEY 20 J1-2	KEY 19 J1-10	KEY 18 J1-18	KEY 17 J2-4	KEY 16 J2-12	KEY 15 J2-20	KEY 14 J3-6	KEY 13 J3-14	KEY 12 J3-22	KEY 11 J4-6	KEY 10 J4-12	KEY 9 J4-18	2ND OCTAVE L.M. KEY INPUT
23	J5-13	J5-13	J5-13	J5-13	J5-13	J5-13	J5-13	J5-13	J5-13	J5-13	J5-13	J5-13	8' L.M. OUTPUT
24	KEY 44 J1-4	KEY 43 J1-12	KEY 42 J1-20	KEY 41 J2-6	KEY 40 J2-14	KEY 39 J2-22	KEY 38 J3-8	KEY 37 J3-16	KEY 36 J4-2	KEY 35 J4-8	KEY 34 J4-14	KEY 33 J4-20	4TH OCTAVE L.M. KEY INPUT
25	KEY 8 J1-6	KEY 7 J1-14	KEY 6 J1-22	KEY 5 J2-8	KEY 4 J2-16	KEY 3 J3-2	KEY 2 J3-10	KEY 1 J3-18			GROUND		1ST OCTAVE L.M. KEY INPUT
26	J6-1	J6-1	J6-1	J6-1	J6-1	J6-1	J6-1	J6-1	J6-1	J6-1	J6-1	J6-1	1' TONEBAR INPUT
27	J6-5	J6-5	J6-5	J6-5	J6-5	J6-5	J6-5	J6-5	J6-5	J6-5	J6-5	J6-5	1-1/3' TONEBAR INPUT
28	J6-2	J6-2	J6-2	J6-2	J6-2	J6-2	J6-2	J6-2	J6-2	J6-2	J6-2	J6-2	1-3/8' TONEBAR INPUT
29	KEY 32 J1-8	KEY 31 J1-16	KEY 30 J2-2	KEY 29 J2-10	KEY 28 J2-18	KEY 27 J3-4	LEY 26 J3-12	KEY 25 J3-20	KEY 24 J4-4	KEY 23 J4-10	KEY 22 J4-16	KEY 21 J4-22	3RD OCTAVE L.M. KEY INPUT
30	J6-4	J6-4	J6-4	J6-4	J6-4	J6-4	J6-4	J6-4	J6-4	J6-4	J6-4	J6-4	2' TONEBAR INPUT
31	J6-3	J6-3	J6-3	J6-3	J6-3	J6-3	J6-3	J6-3	J6-3	J6-3	J6-3	J6-3	2-2/3' TONEBAR INPUT
32	KEY 44 J1-7	KEY 43 J1-15	KEY 42 J2-1	KEY 41 J2-9	KEY 40 J2-17	KEY 39 J3-3	KEY 38 J3-11	KEY 37 J3-19	KEY 36 J4-3	KEY 35 J4-9	KEY 34 J4-15	KEY 33 J4-21	5TH OCTAVE U.M. KEY INPUT
33						GROUND							1ST OCTAVE U.M. KEY INPUT
34	J6-6	J6-6	J6-6	J6-6	J6-6	J6-6	J6-6	J6-6	J6-6	J6-6	J6-6	J6-6	4' TONEBAR INPUT
35	J6-7	J6-7	J6-7	J6-7	J6-7	J6-7	J6-7	J6-7	J6-7	J6-7	J6-7	J6-7	8' TONEBAR INPUT
36	J6-8	J6-8	J6-8	J6-8	J6-8	J6-8	J6-8	J6-8	J6-8	J6-8	J6-8	J6-8	5-1/3' TONEBAR INPUT
37	J6-9	J6-9	J6-9	J6-9	J6-9	J6-9	J6-9	J6-9	J6-9	J6-9	J6-9	J6-9	16' TONEBAR INPUT
38						GROUND							
39	(F6) J5-4	(F5) J5-3	(F5) J5-3	(F5) J5-3	(F5) J5-3	(F5) J5-3	(F5) J5-3	(F4) J5-2	(F4) J5-2	(F4) J5-2	(F4) J5-2	(F4) J5-2	SQUARE WAVE OUTPUTS TO SINE FILTERS.
40	(F4) J5-2	(F3) J5-1	(F3) J5-1	(F3) J5-1	(F3) J5-1	(F3) J5-1	(F3) J5-1	(F3) J5-1			GROUND		

(2)

FIGURE 3-6
GENERATOR BOARD
CHART - I.C. CONNECTIONS
(124-000321)

F#
E
D#
D
C#
J46
TONE BARS J6
I.C.7
I.C.8
I.C.9
I.C.10
I.C.11
I.C.12
J7
-28V
-14V
GND
SUST.
MDD FREQUENCY
S WITH CAUTION
1000 RESISTORS
IN THIS ROW
J3-A
J4-A
J4
COMP. SIDE
ASS'Y NO. 124-0003 21
023-047999



094-000380—D

FIGURE 3-8
I.C. DIVIDER KEYER PACKAGE
SCHEMATIC
(075-000380)

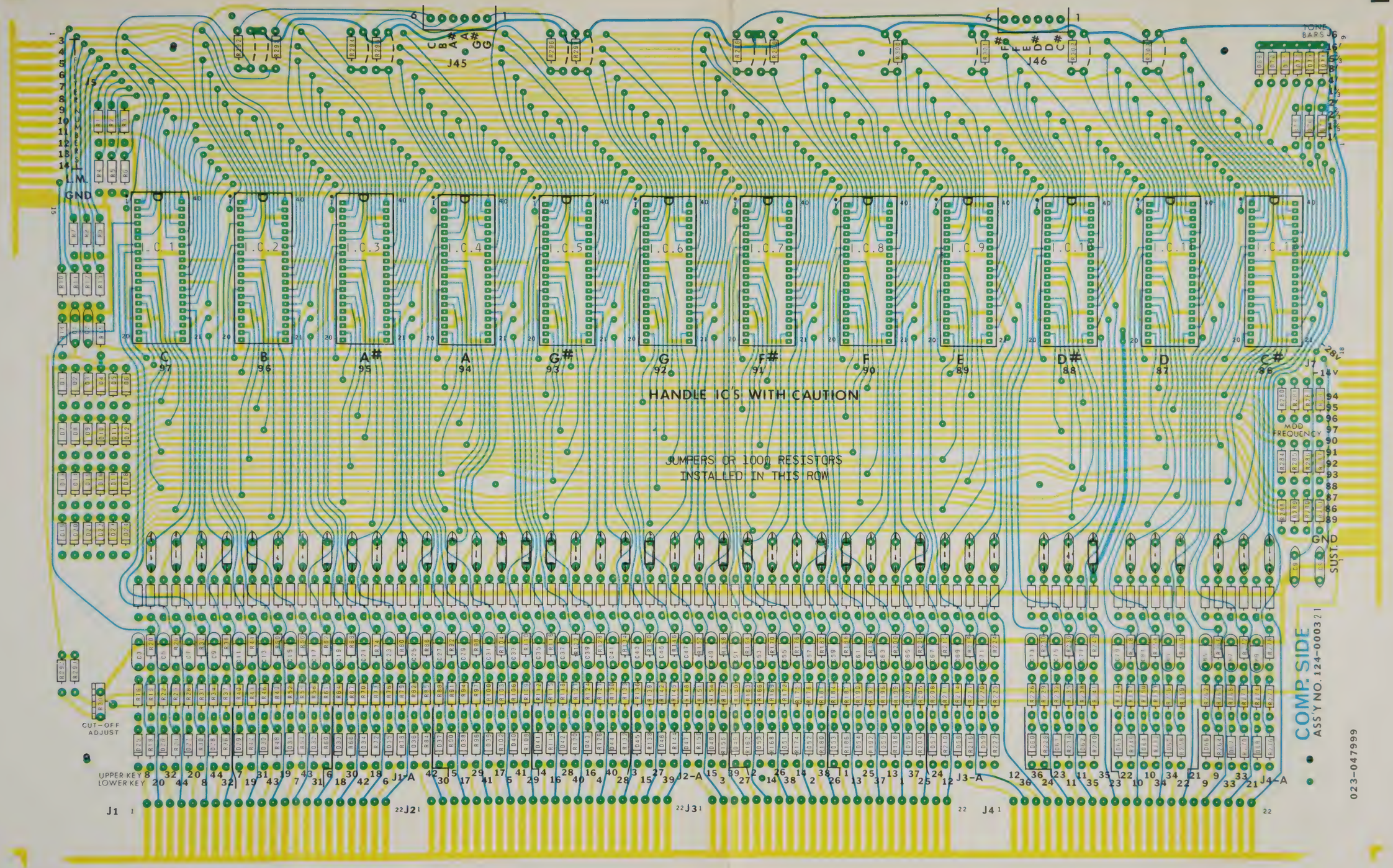
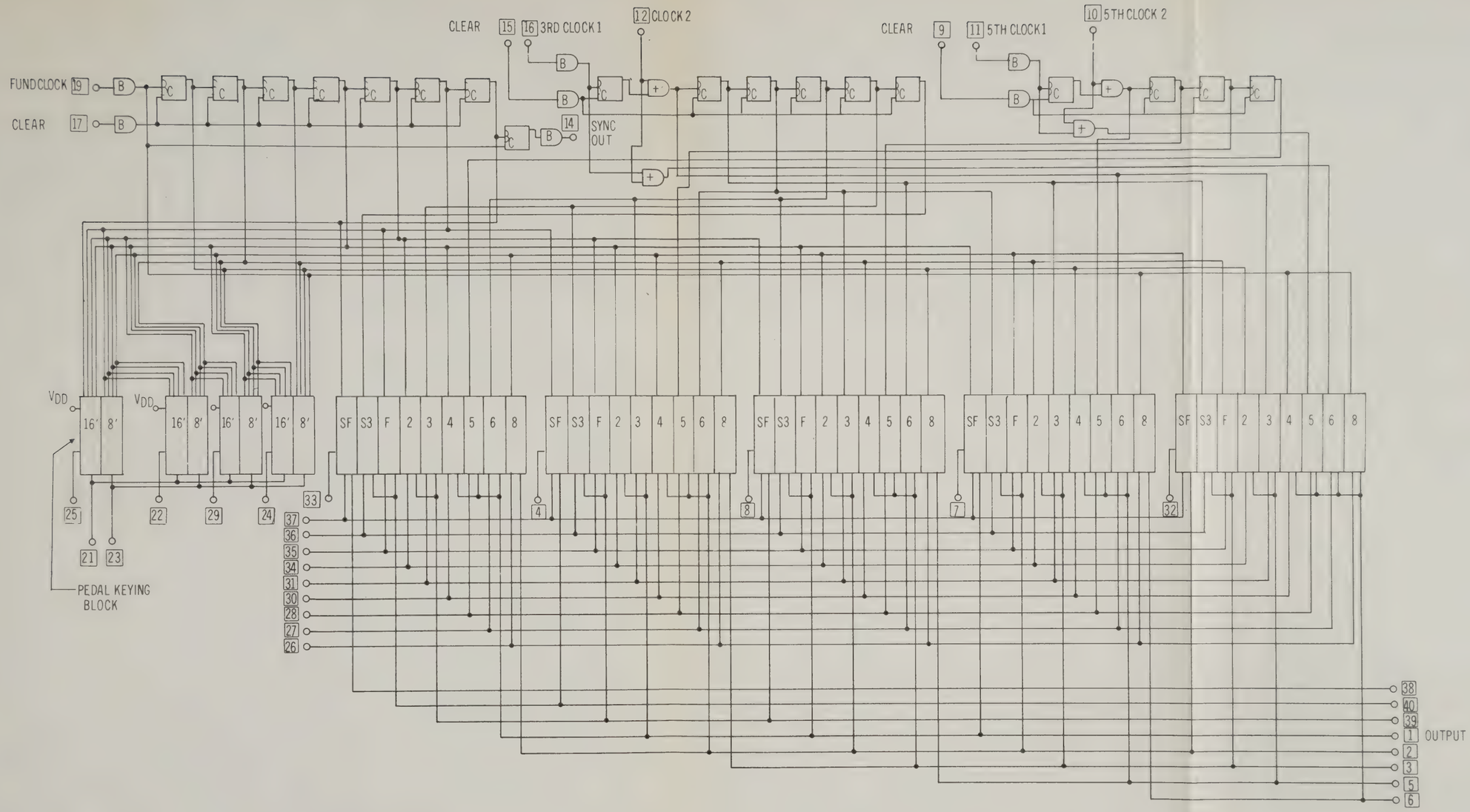
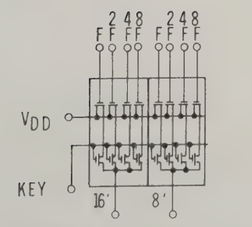


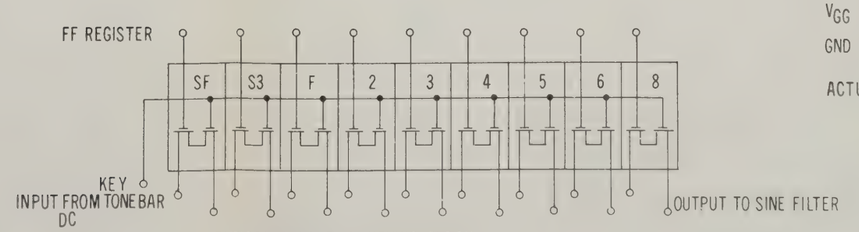
FIGURE 3-7
GENERATOR BOARD
LEGEND AND SIDE #1 AND #2
OF COPPER PATTERN
(124-000321)

2





TYPICAL PEDAL KEYING BLOCK



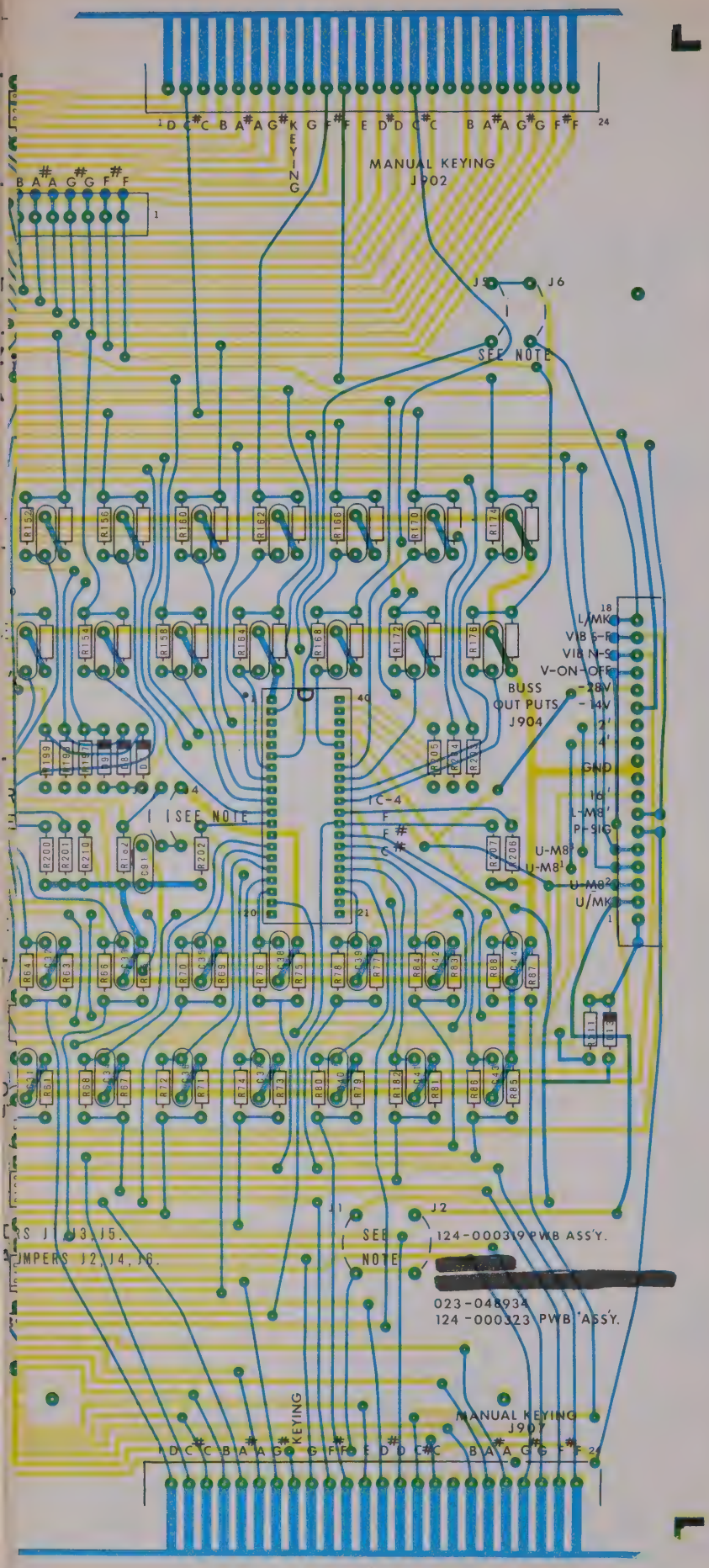
TYPICAL SYNTHESIS KEYING BLOCK

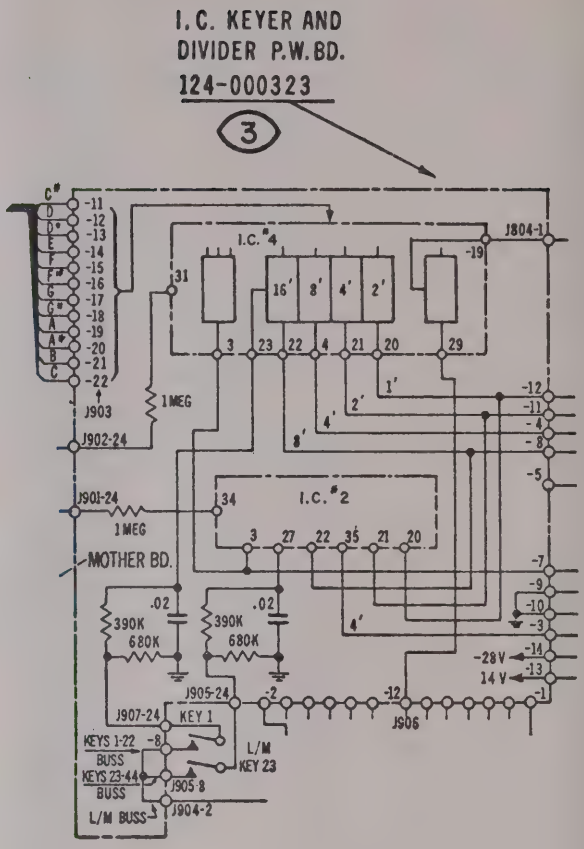
VDD 13
VGG 20
GND 18

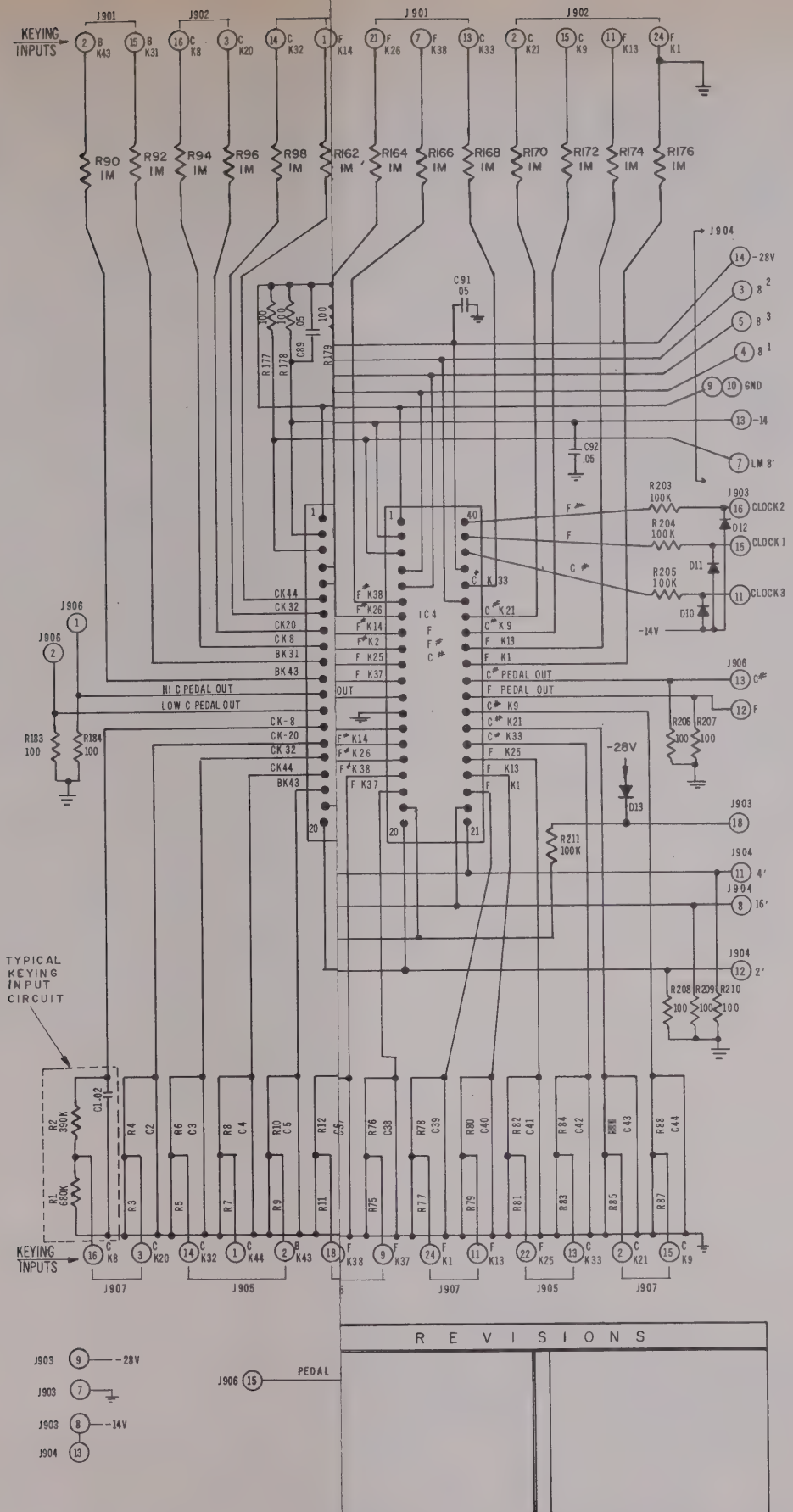
ACTUAL PIN CONNECTIONS ☐

094-000380—D

FIGURE 3-8
I.C. DIVIDER KEYER PACKAGE
SCHEMATIC
(075-000380)


MANUAL KEYING
J902
SEE NOTE
J5
J6
BUSS
OUT PUTS
J904
L/MK
VIB S-F
VIB N-S
V-ON-OFF
-28V
-14V
2'
4'
GND
8'
16'
L-M8'
P-91G
U-M8'
U-M8'
U-M8'
U/MK
IC-4
SEE NOTE
J1
J2
SEE NOTE
124-000319 PWB ASS'Y.
023-048934
124-000323 PWB ASS'Y.
MANUAL KEYING
J907


I.C. KEYER AND
DIVIDER P.W.BD.
124-000323
3
I.C. #4
I.C. #2
J804-1
J903
J902-24
J901-24
1 MEG
MOTHER BD.
.02
390K
680K
J905-24
J907-24
KEY 1
KEYS 1-22
BUSS
KEYS 23-44
BUSS
L/M BUSS
L/M
KEY 23
J905-8
J904-2
J906
-28V
14 V



REVISIONS	

3

FIGURE 3-10
KEYER DIVIDER BOARD
SCHEMATIC
(124-000323)

COMP. SIDE

HANDLE I C'S WITH CARE

MANUAL KEYING J901

J913

J914

AUTO CHORD KEYING

ABOVE CONNECTORS J-914 AND J-915 FOR 124-000319-001 ONLY

MANUAL KEYING J902

SEE NOTE

L/MK
VIB S-F
VIB N-S
V-ON-OFF
BUSS OUT PUTS
-28V
-14V
GND

J904

MDD INPUTS J908

-28V
-14V
GND
VIB S/F
VIB N/S
VIB ON/OFF

MANUAL KEYING J906

PEDAL SIGNALS J905

MANUAL KEYING J907

NOTE:

1. THE 124-000319 BOARD REQUIRE JUMPERS J1, J3, J5.
2. THE 124-000319-001 BOARD REQUIRE JUMPERS J2, J4, J6.

SEE NOTE

124-000319 PWB ASS'Y.

023-048934
124-000323 PWB ASS'Y.

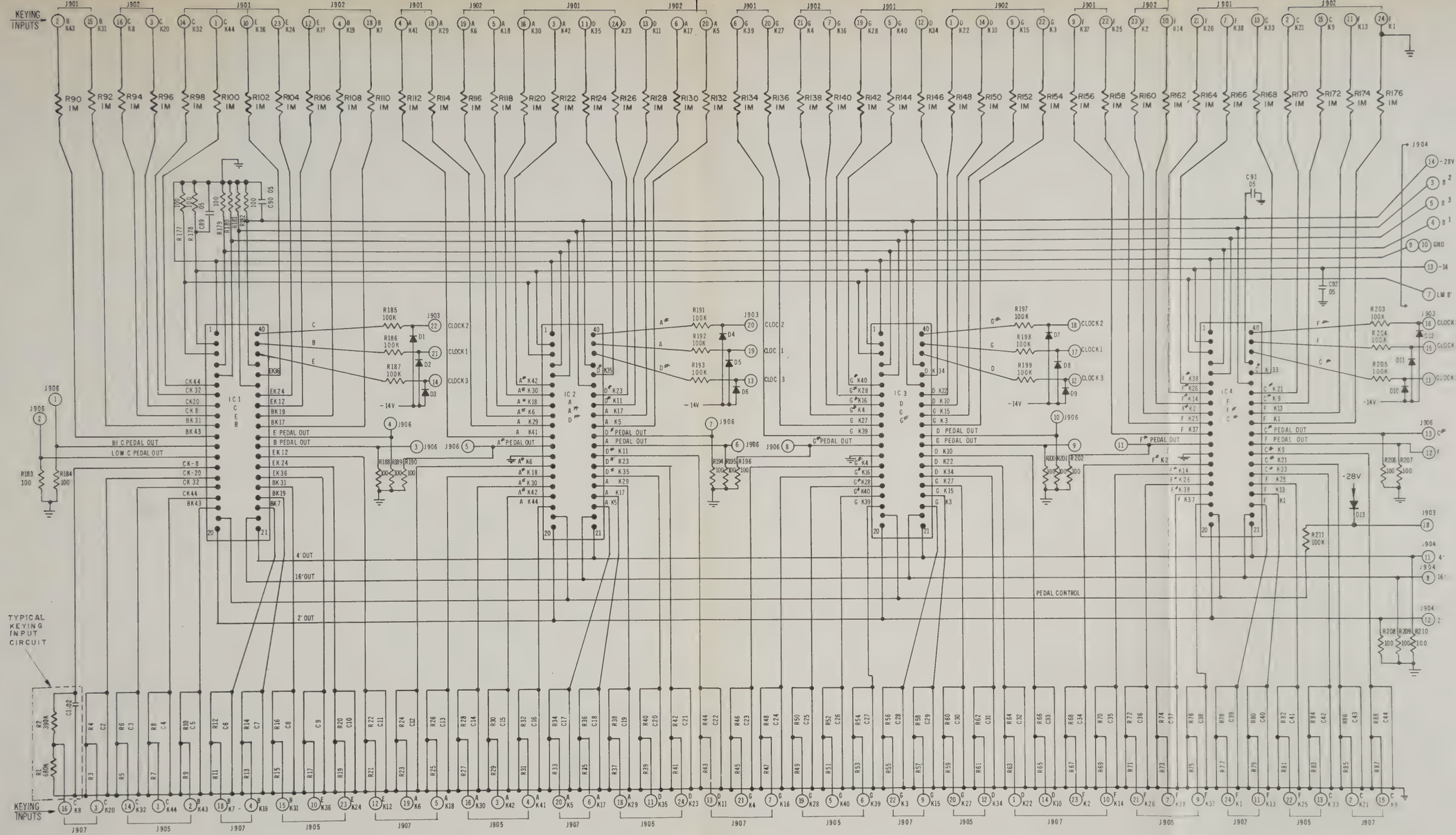
I. C. KEYER AND DIVIDER P.W.BD.
124-000323

(3)

J903
J902-24
J901-24
1MEG
MOTHER BD
390K
680K
.02
J905-24
J907-24
KEY 1
KEYS 1-22
KEYS 23-44
BUSS
L/M KEY 23
J905 B
J904-2
J906
-28V
14 V

FIGURE 3-9
KEYER DIVIDER BOARD
LAYOUT AND THEORY
(124-000323)

(3)



NOTES:

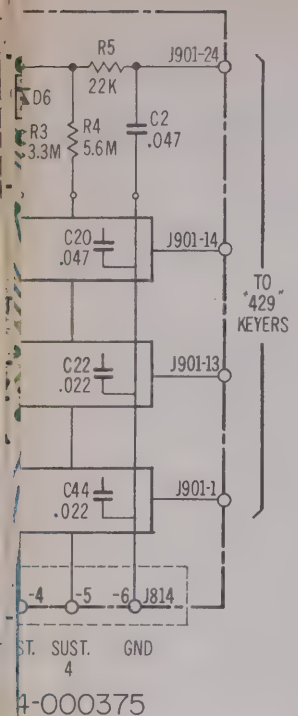
1. K— KEY NUMBER LEFT TO RIGHT FROM FRONT OF ORGAN.
2. J905,J907: UPPER MANUAL KEYING.
3. J906: PEDAL OUTPUTS.
4. J901,J902: UPPER MANUAL PERCUSSION KEYING.
5. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±10%;
   ALL CAPACITOR VALUES ARE IN MICROFARADS.
6. SYMBOL (7) INDICATES PIN AND IT'S NUMBER IN CONNECTOR.

QTY	DESIGNATION SYMBOL	HAMMOND PART #	JEDEC PART #
13	D1 THRU D13	001-026080	IN 4148
4	I.C.#1 THRU I.C.#4	075-000429	———

094-048994-0, SCHEMATIC DIAGRAM OF DIVIDER KEYER P.W.B. 124-000323

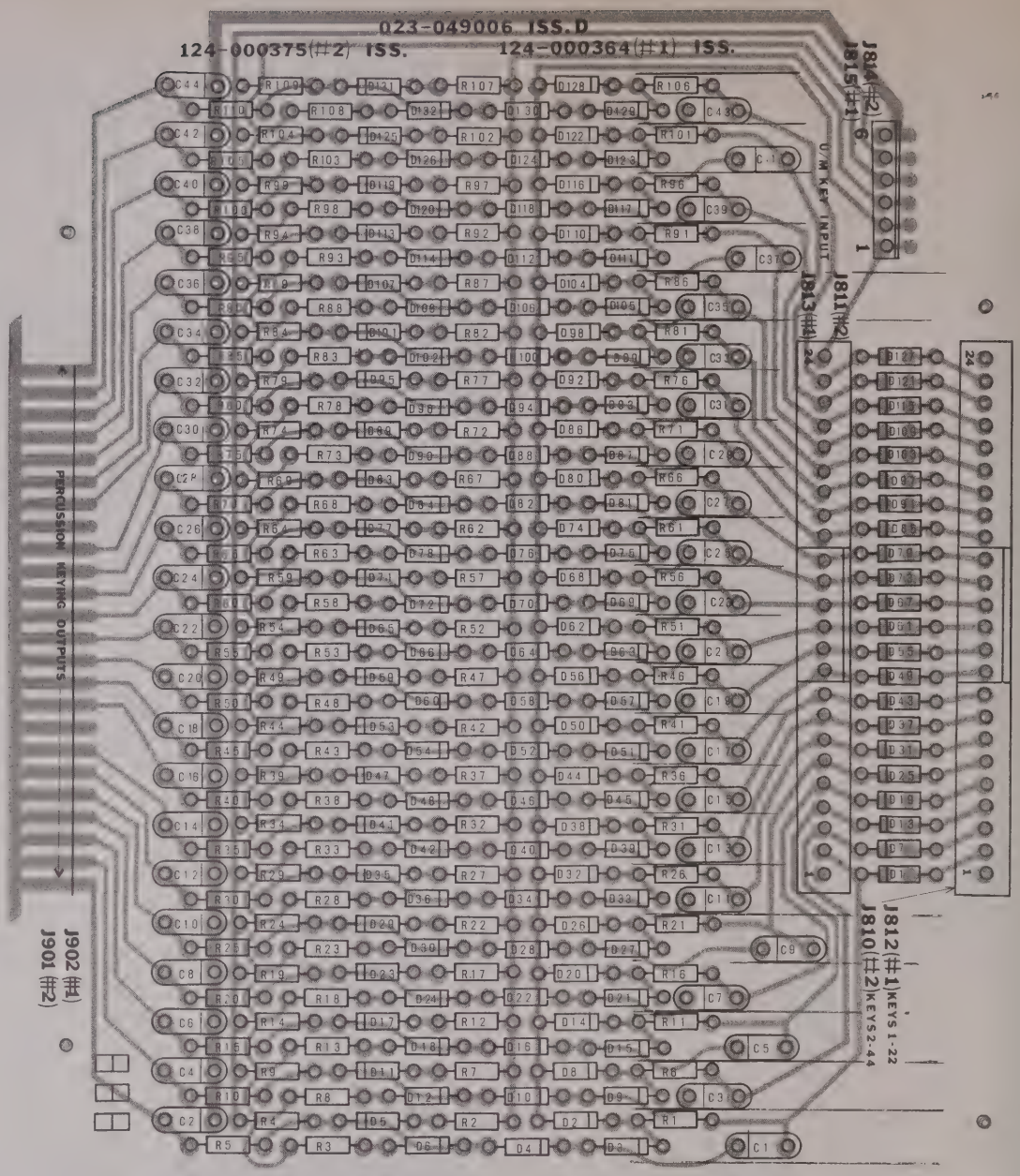
REVISIONS

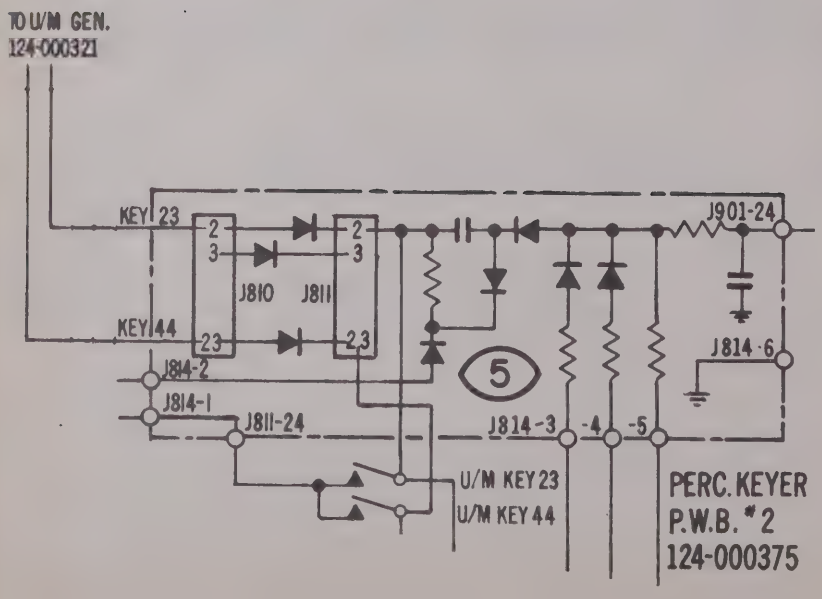
FIGURE 3-10
KEYER DIVIDER BOARD
SCHEMATIC
(124-000323)



4-000375

SIONS





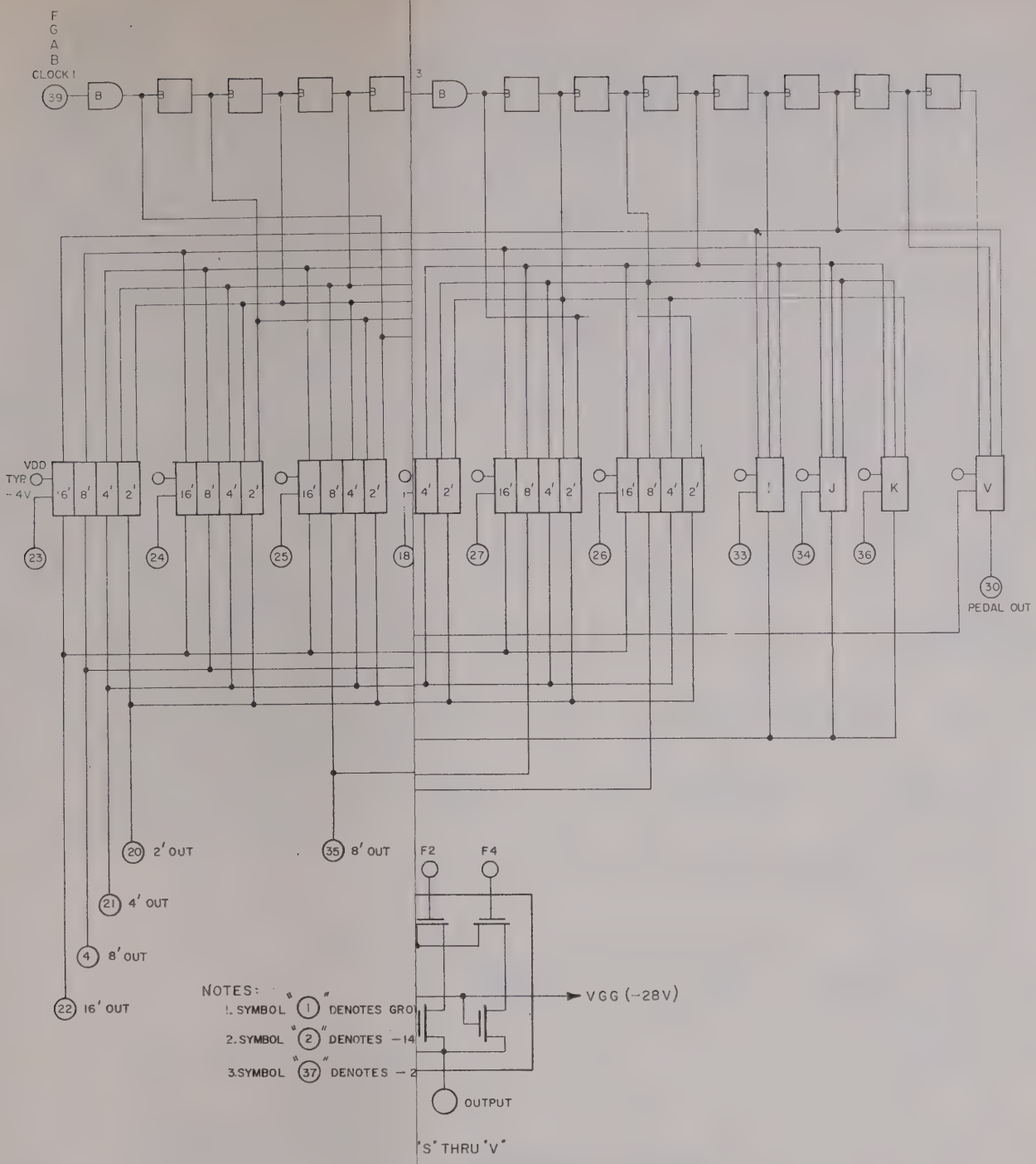
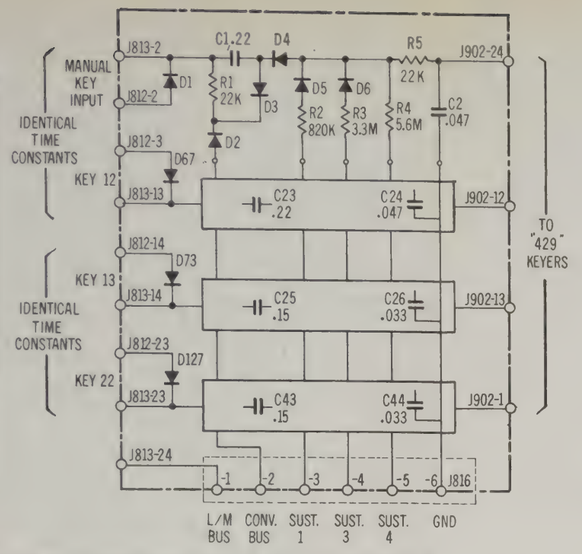


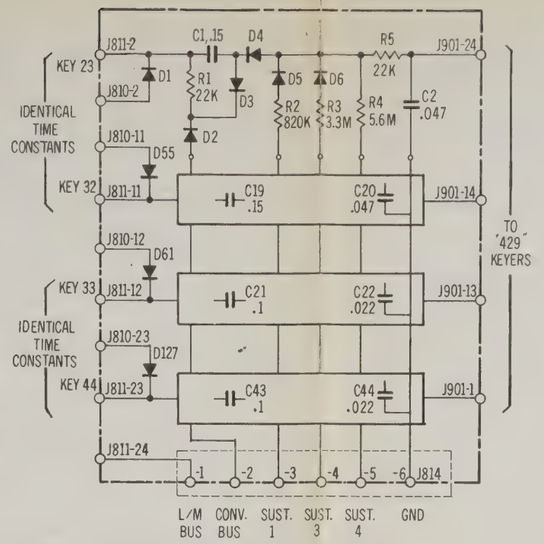
FIGURE 3-12
I.C. 429 DIVIDER KEYER PACKAGE
SCHEMATIC
(075-000429)

KEY #	J813	J812	J902
1	2	2	24
2	3	3	23
3	4	4	22
4	5	5	21
5	6	6	20
6	7	7	19
7	8	8	18
8	9	9	16
9	10	10	15
10	11	11	14
11	12	12	13
12	13	13	12
13	14	14	11
14	15	15	10
15	16	16	9
16	17	17	7
17	18	18	6
18	19	19	5
19	20	20	4
20	21	21	3
21	22	22	2
22	23	23	1

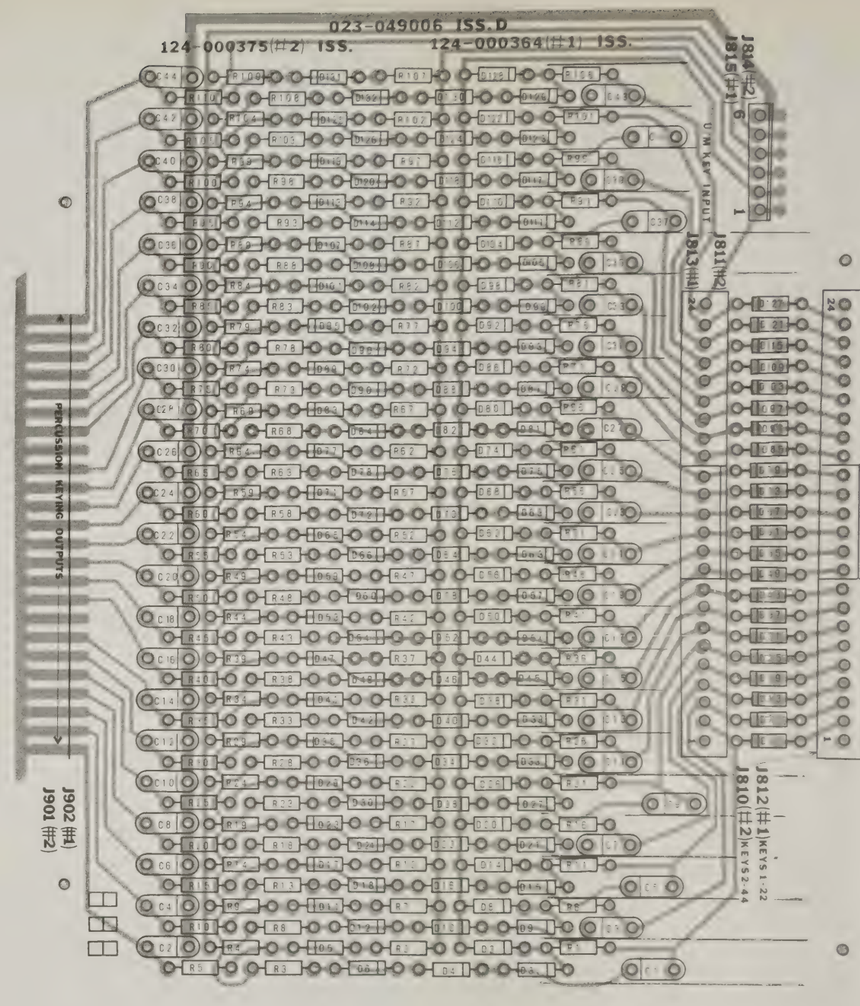


PERCUSSION TIME CONSTANT P.W.B.#1, 124-000364

KEY #	J811	J810	J901
23	2	2	24
24	3	3	23
25	4	4	22
26	5	5	21
27	6	6	20
28	7	7	19
29	8	8	18
30	9	9	16
31	10	10	15
32	11	11	14
33	12	12	13
34	13	13	12
35	14	14	11
36	15	15	10
37	16	16	9
38	17	17	7
39	18	18	6
40	19	19	5
41	20	20	4
42	21	21	3
43	22	22	2
44	23	23	1



PERCUSSION TIME CONSTANT P.W.B.#2, 124-000375



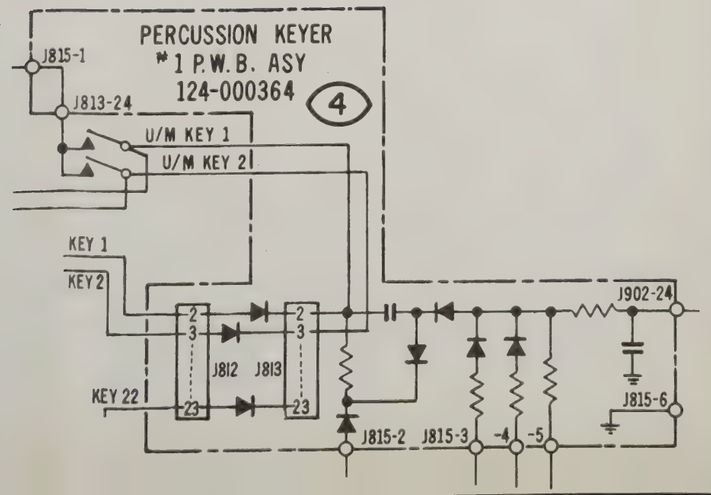
NOTES:

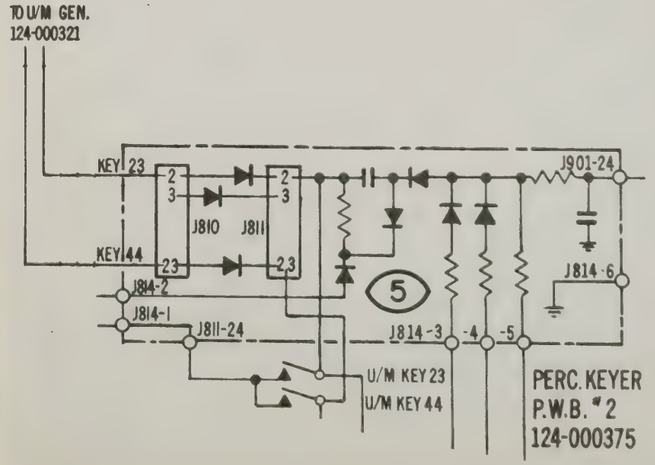
1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±10%;
   ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. SYMBOL "--○-" INDICATES PIN AND IT'S NO. IN CONNECTOR.

QTY	DESIGNATION SYMBOL	HAMMOND PART#	JEDEC PART #
2X	D1 THRU D127	001-026080	IN 4148

094-049010-0, SCHEMATIC DIAGRAM OF PERCUSSION TIME CONSTANT P.W.B. #1, 124-000364 & #2, 124-000375

REVISIONS





4 5

FIGURE 3-11
PERCUSSION KEYERS #1 AND #2
SCHEMATIC, LAYOUT AND THEORY
(124-000364)
(124-000375)

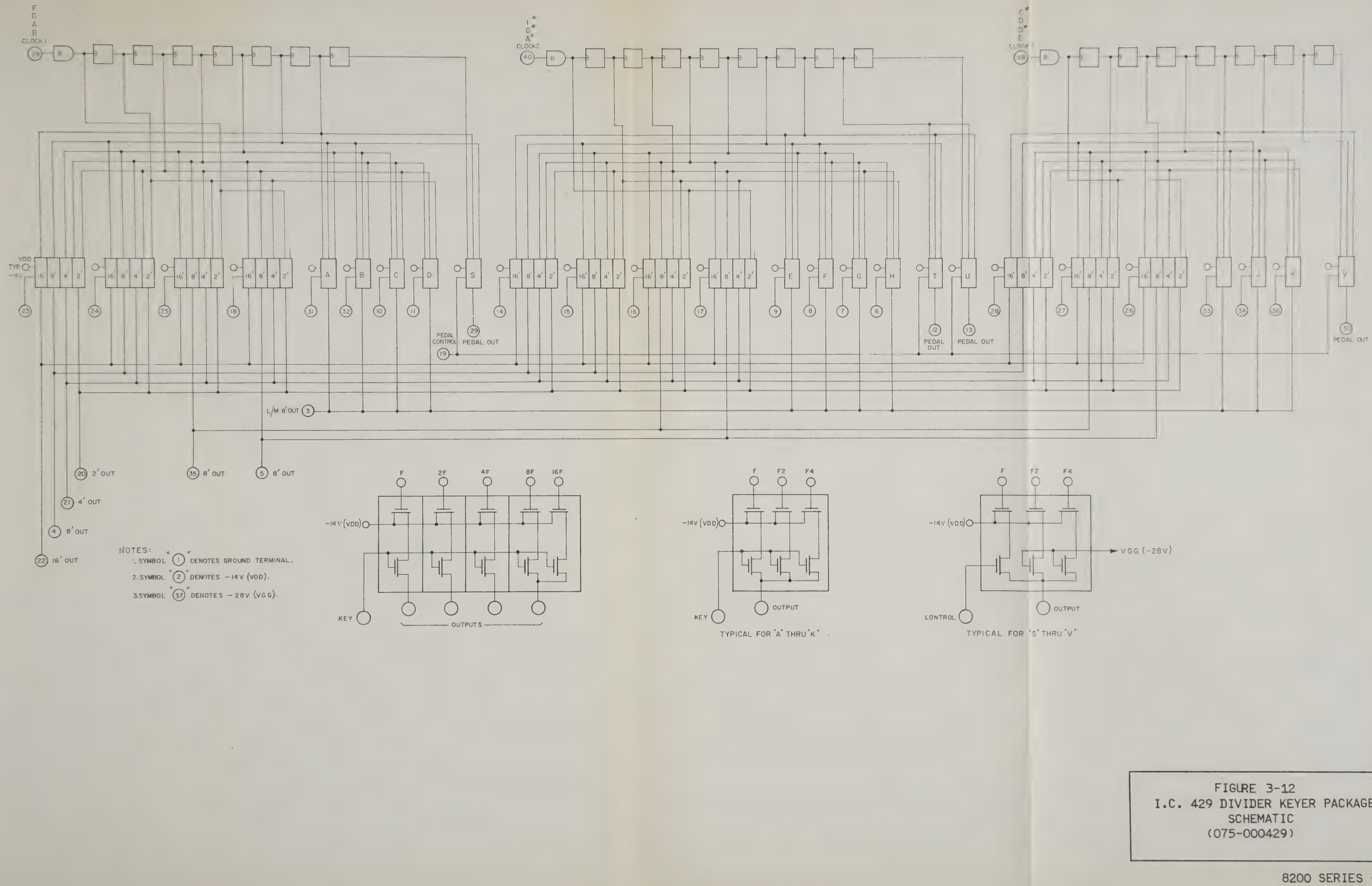
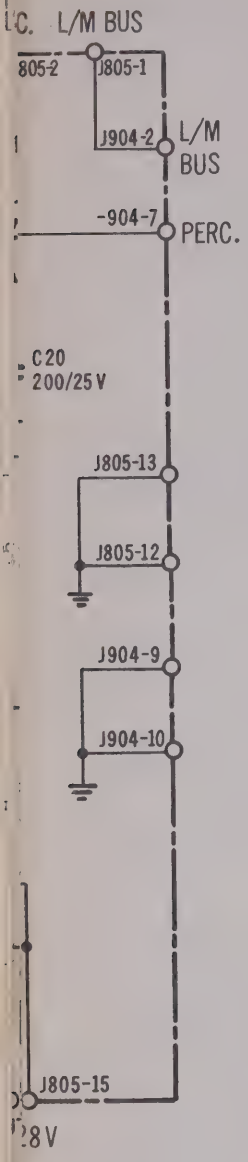
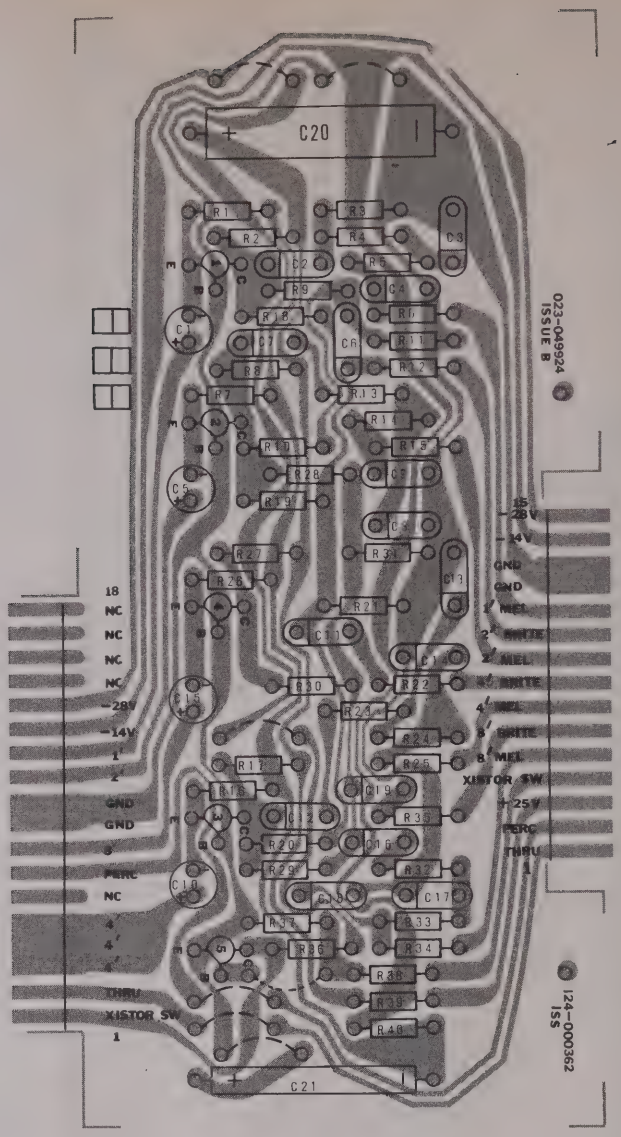


FIGURE 3-12
I.C. 429 DIVIDER KEYER PACKAGE
SCHEMATIC
(075-000429)



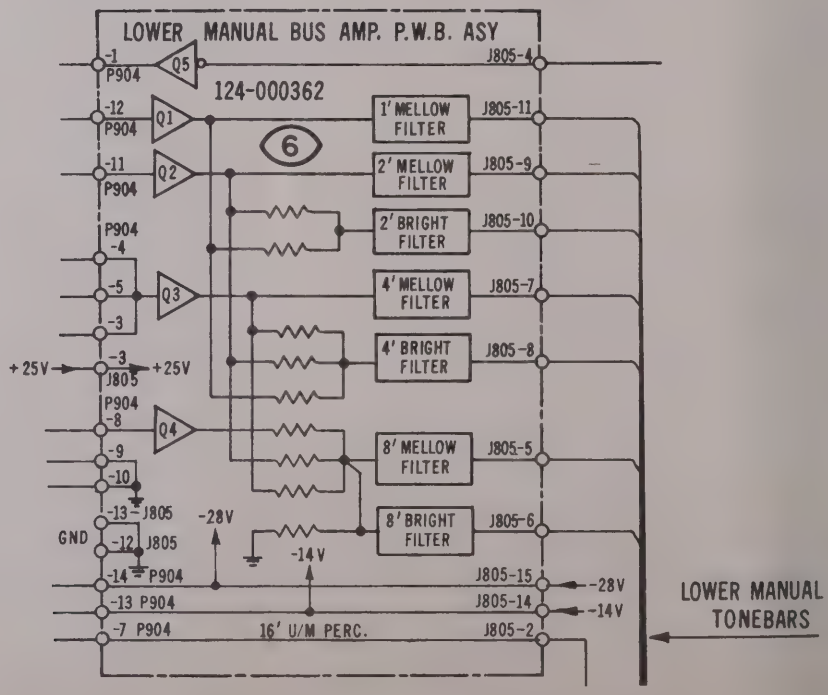
REVISIONS


C20
C21
023-049924 ISSUE B
124-000362 ISS
18 NC NC NC NC -28V -14V 1 2 GND GND 3 PERC NC 4 4 4 THRU XISTOR SW 1
15 -28V -14V GND GND 1 MEL 2 BRITE 2 MEL 3 BRITE 4 MEL 4 BRITE 8 MEL XISTOR SW +25V PERC THRU 1

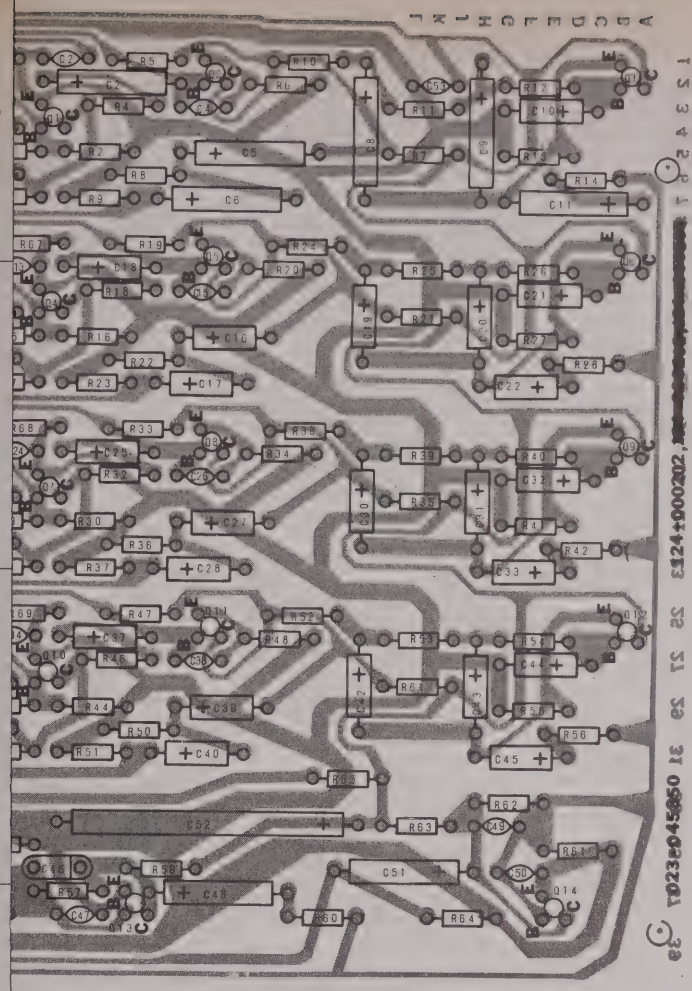
NOTES:

1. IF OTHERWISE NOT SPECIFIED: ALL RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±5%; ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. SYMBOL "⏚" INDICATES PIN AND IT'S NUMBER IN ONE OF TWO CONNECTORS: J805 OR J904.

DESIGNATION SYMBOL	HAMMOND PART NO.	JEDEC PART NO.
Q1 THRU Q4	001-021134	2N 3394
Q5	001-021172	2N 4249



FOUR FILTER



J102-4 FILTER No 6 INPUT — C1 100 15 — R66 100 ±10%

J102-5 FILTER No 8 INPUT — C12 100 15 — R67 100 ±10%

J102-6 FILTER No 10 INPUT — C23 50 15 — R68 100 ±10%

J102-7 FILTER No 12 INPUT — C34 50 15 — R69 100 ±10%

J102-9 OUTPUT BUS FILTERS 1 to 5 FROM PIN 11 ON 124-000201 P.W.B. — R70 470 ±10%

PHASE INVERTER

STOR VALUES ARE IN OHMS, 1/2 WATT, ±5%.
AND ELECTROLYTIC CAPACITOR VALUES,
ARE IN MICROFARADS.
ARE IN PICOFARADS, ± 2.5%.
0PF, 200 PF AND C53 ARE

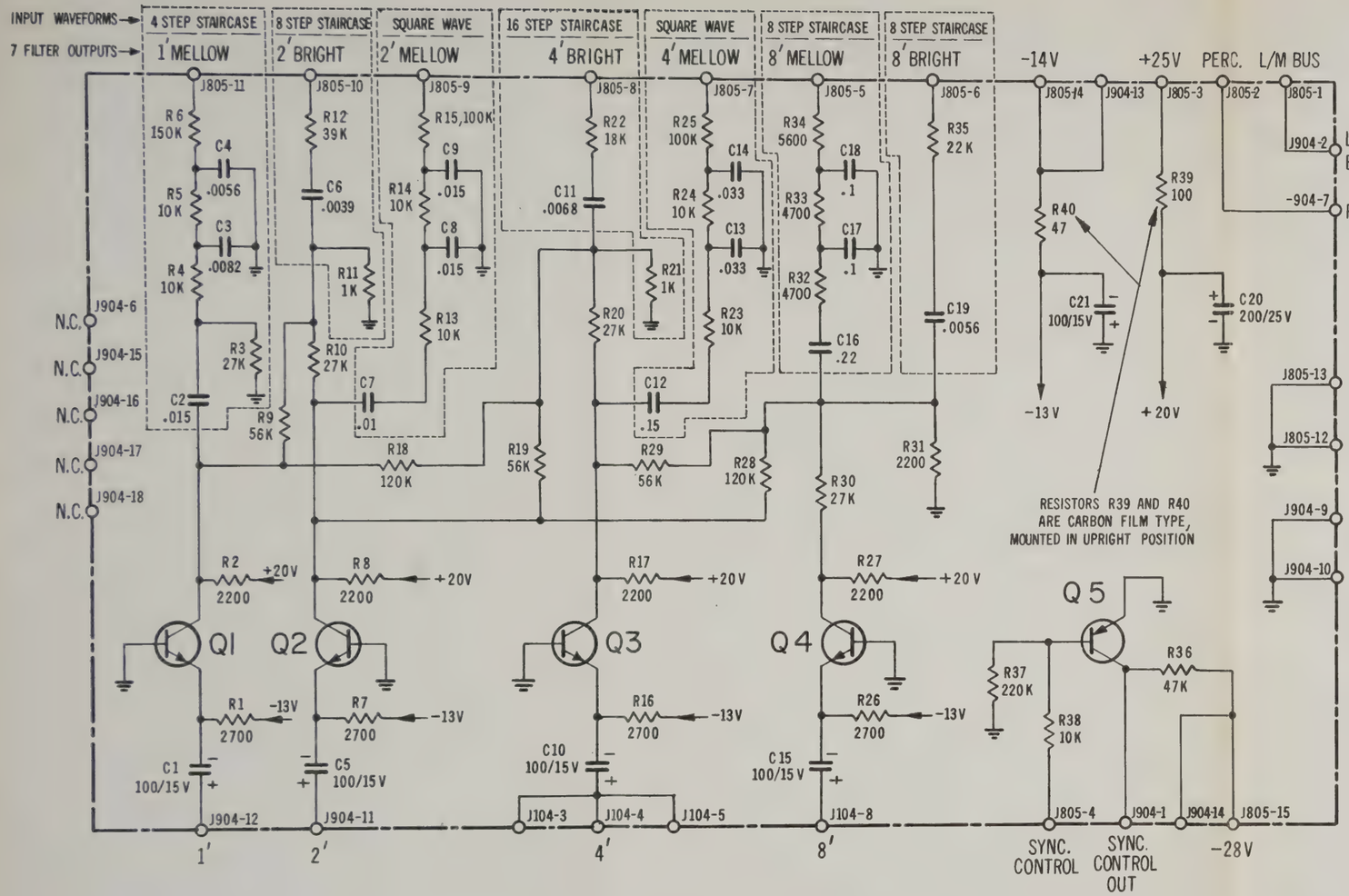
BOL	HAMMOND PART #	JEDEC PART #
	001-021172	2N 4249
	001-021260	2N 5826
	001-021135	2N 3394

S I O N S

D		WERE 13K, R70 & R71 ADDED. Q13 & Q14 WERE 001-021135.

7

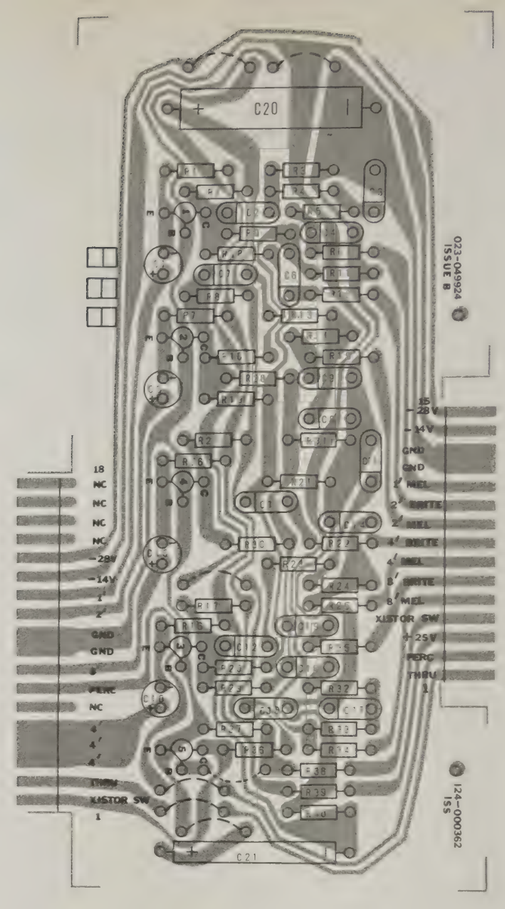
FIGURE 3-14
SINE WAVE FILTER #2
CHEMATIC, LAYOUT AND THEORY
(124-000202)



REVISIONS

NOTES:

1. IF OTHERWISE NOT SPECIFIED: ALL RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±5%; ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. SYMBOL "⏚" INDICATES PIN AND IT'S NUMBER IN ONE OF TWO CONNECTORS: J805 OR J904.



094-050382-A, SCHEMATIC DIAGRAM OF L/M BUSS AMP. P.W.B. 124-000362

QTY	DESIGNATION SYMBOL	HAMMOND PART NO.	JEDEC PART NO.
4	Q1 THRU Q4	001-021134	2N 3394
1	Q5	001-021172	2N 4249

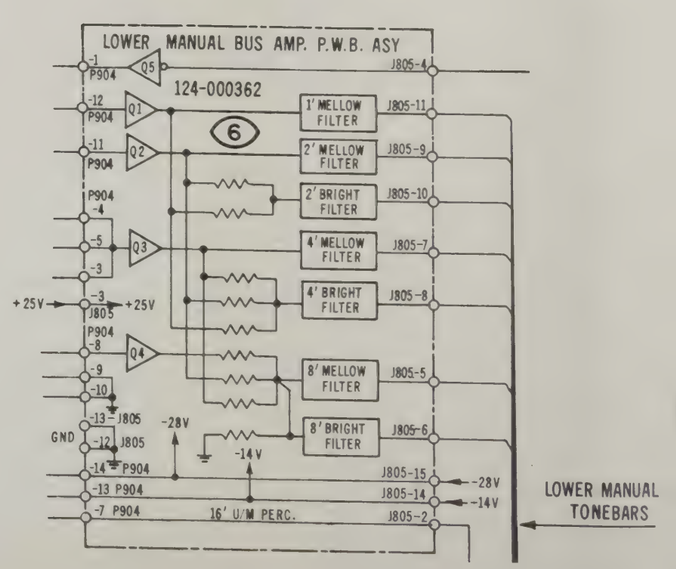
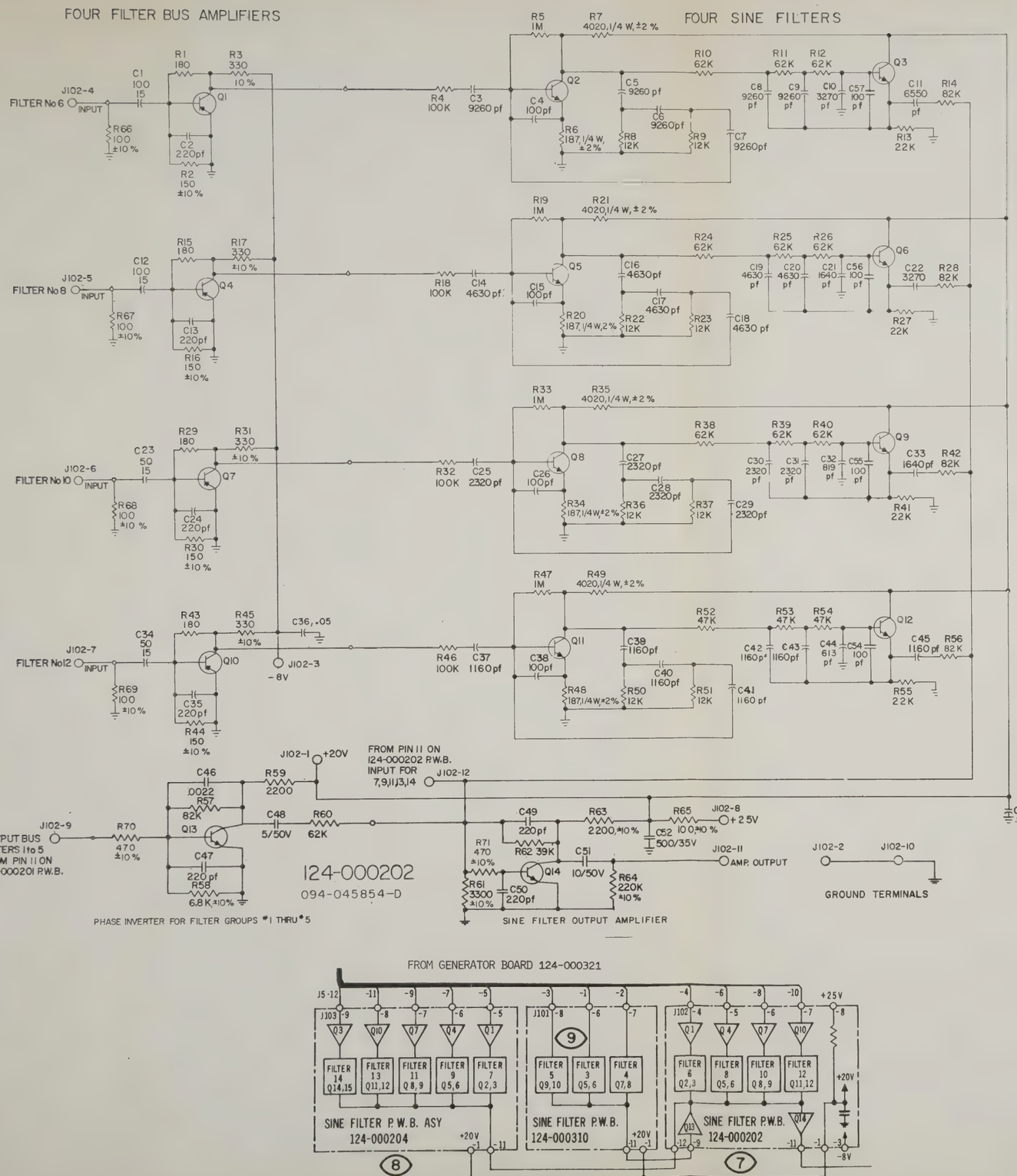
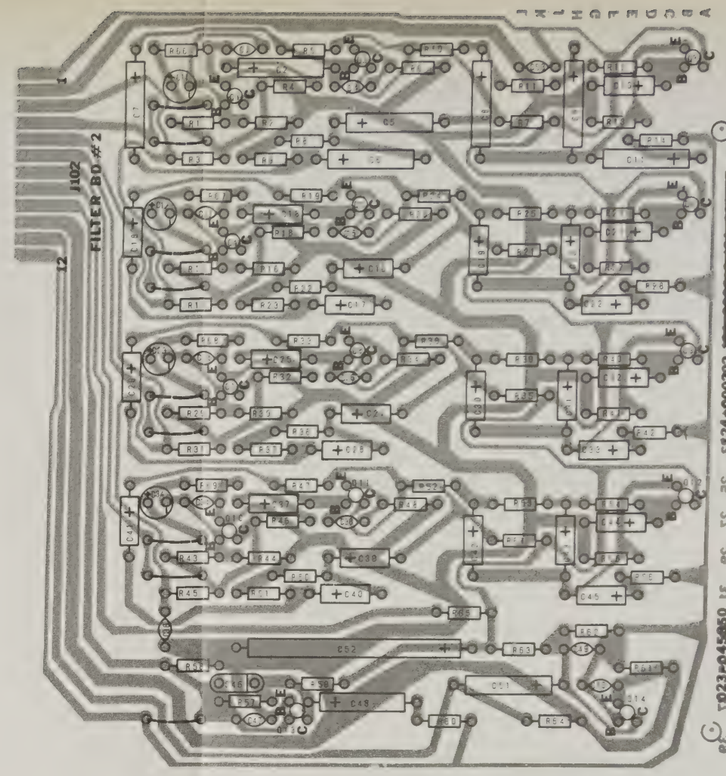


FIGURE 3-13
LOWER MANUAL BUS AMP
BOARD-SCHEMATIC, LAYOUT AND THEORY
(124-000362)

6





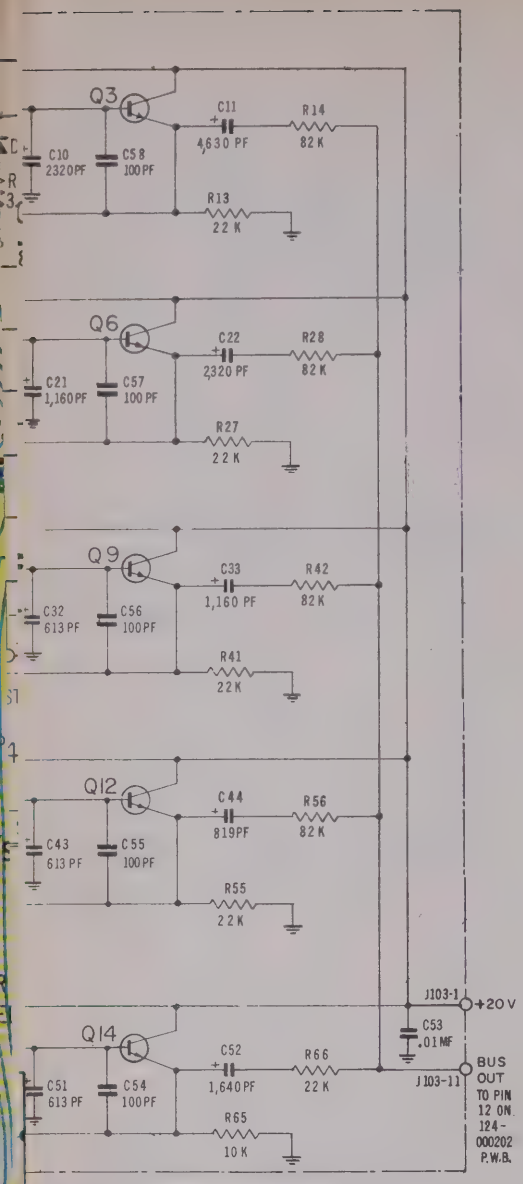
NOTES:

1. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±5%.
2. MYLAR CAPACITOR VALUES, ±10 % AND ELECTROLYTIC CAPACITOR VALUES, SHOWN WITH WORKING VOLTAGE, ARE IN MICROFARADS.
3. POLYSTYRENE CAPACITOR VALUES ARE IN PICOFARADS, ± 2.5%.
4. CAPACITORS WITH VALUES OF 100PF, 200 PF AND C53 ARE CERAMIC, ± 10 %.

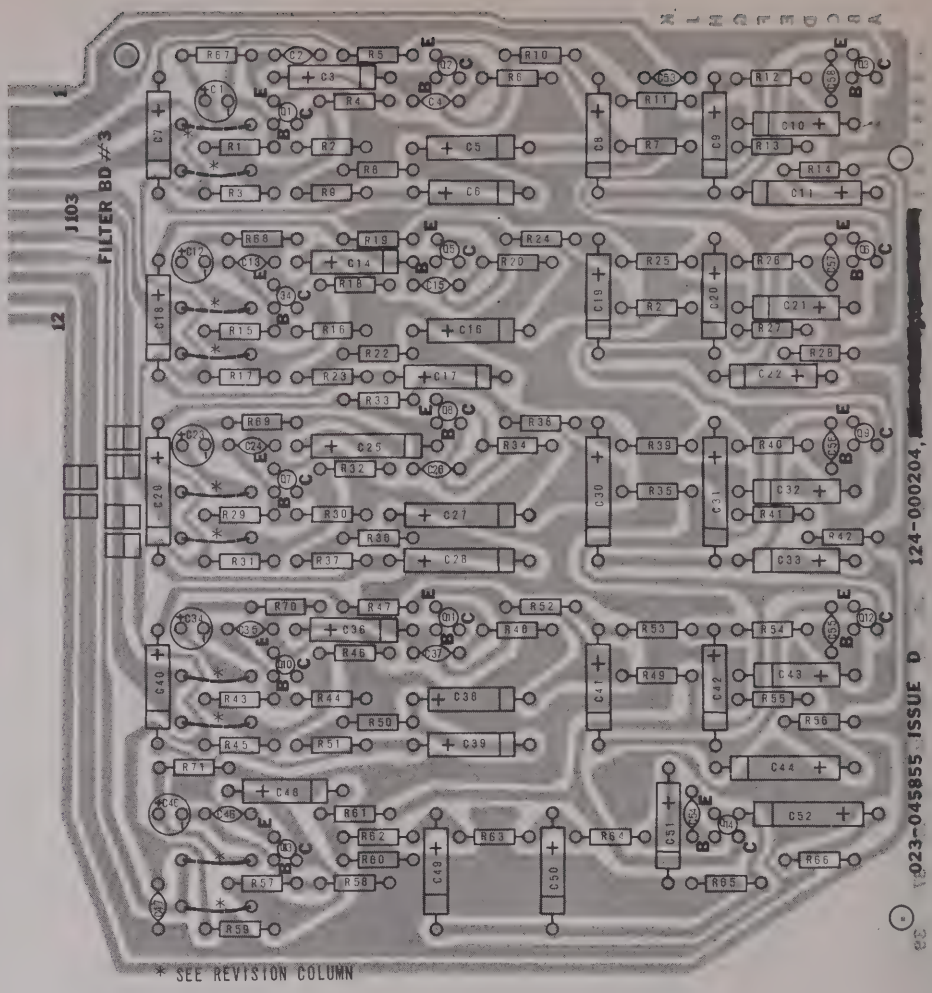
QTY	DESIGNATION SYMBOL	HAMMOND PART #	JEDEC PART #
4	Q1, Q4, Q7, Q10	001-021172	2N 4249
6	Q2, Q5, Q8, Q11, Q13, Q14	001-021260	2N 5826
4	Q3, Q6, Q9, Q12	001-021135	2N 3394

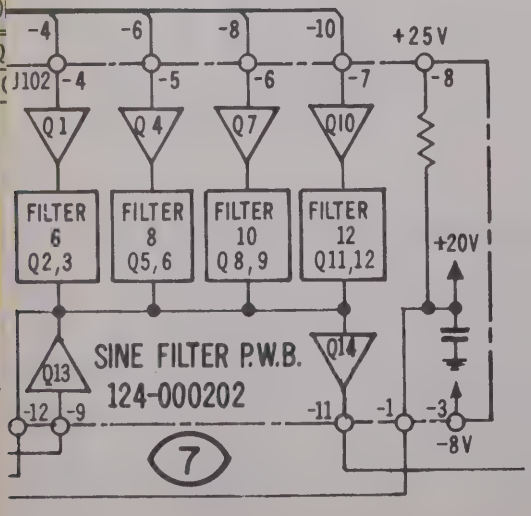
REVISIONS			
A	"SPINETS ONLY" DELETED FROM NOTE 2.	D	WERE 13K. R70 & R71 ADDED. Q13 & Q14 WERE 001-021135.
B	R2, R16, R30 & R44 WERE 120Ω. R7, R21, R35 & R49 WERE 3.3 K. R6, R20 & R34 WERE 150Ω. R48 WAS 130Ω. R61 WAS 6800Ω. R62 WAS 82 K. Q2, Q5, Q8, Q11 WERE 001-021070. C49 WAS 100 PF. C11 WAS 9260 PF. C22 WAS 4630 PF. C33 WAS 2320 PF.		
C	R1, R15, R29 & R43 WERE 120Ω. R2, R16, R30 & R44 WERE 330Ω.		
D	ADDED C54 THRU C58. R6, R20, R34 & R48 WERE 180Ω. R7, R21, R35 & R49 WERE 3.9 K. R8, R9, R22, R23, R36, R37, R50 & R51		

FIGURE 3-14
SINE WAVE FILTER #2
CHEMATIC, LAYOUT AND THEORY
(124-000202)



E V I S I O N S		
RE 120Ω..R7,R21,R35,R49 WERE 150Ω..R48 WAS 120Ω. 01-021070.C11 WAS 4,630 PF. 33 WAS 1,160 PF.	C	R21,R35,R49 WERE 3.9 K..R34 WAS 160Ω..R48 WAS 150Ω..R8,R9,R22,R23,R36,R37,R50,R51 WERE 13 K.
ERE 120Ω..R2,R16,R30,		
..R6 & R20 WERE 180Ω..R7,		





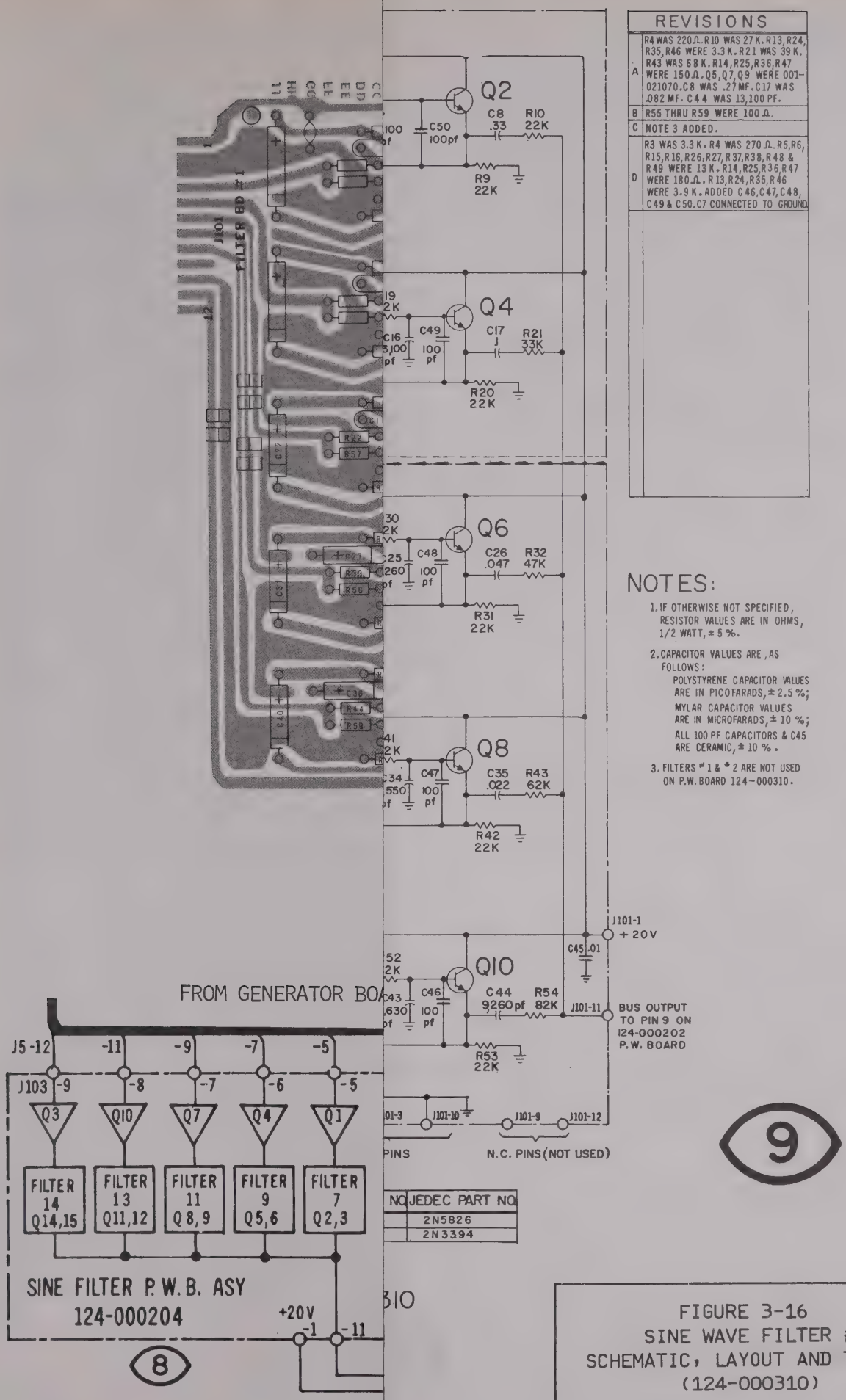
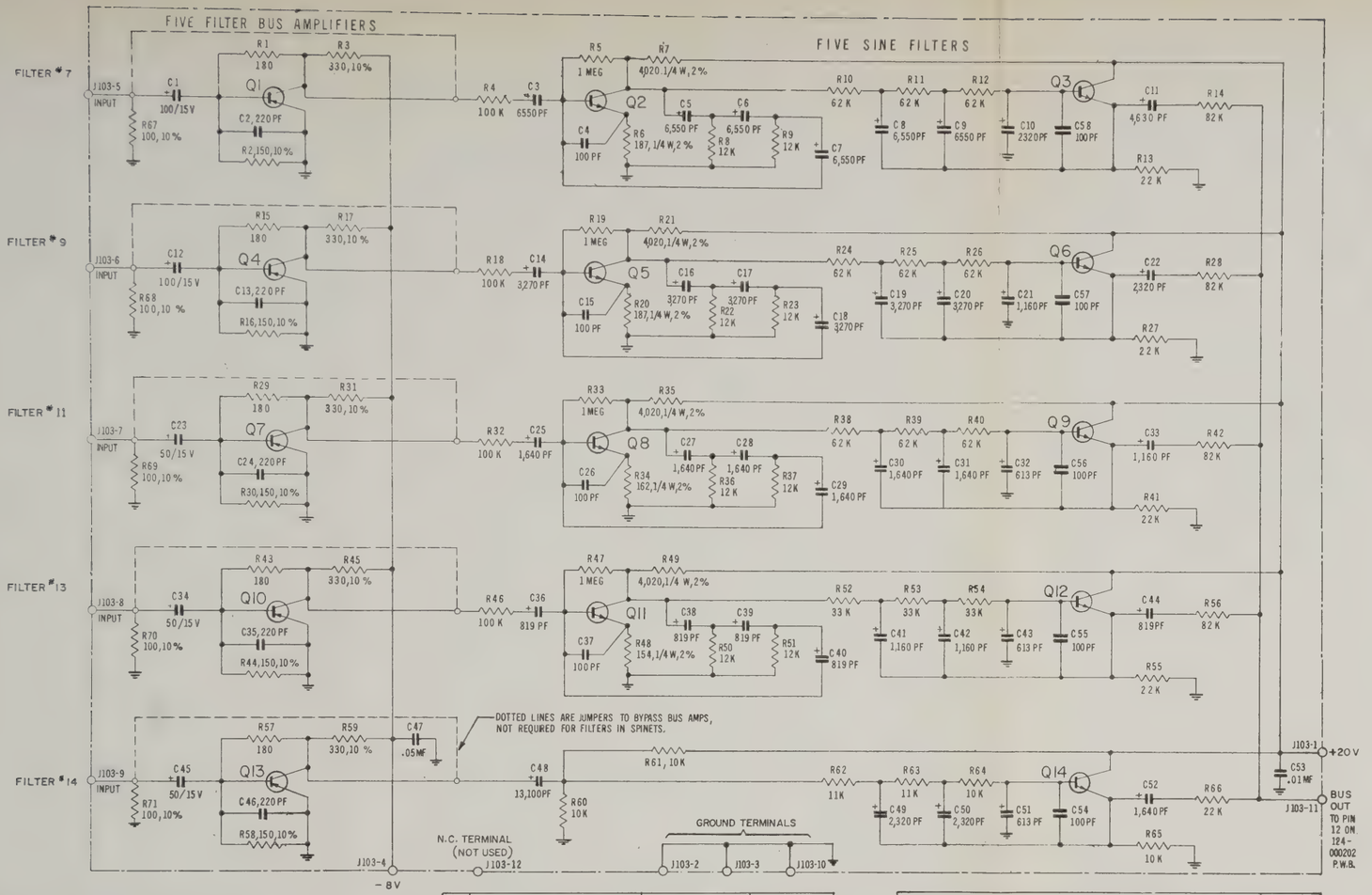

REVISIONS
A R4 WAS 220Ω. R10 WAS 27K. R13, R24, R35, R46 WERE 3.3K. R21 WAS 39K. R43 WAS 68K. R14, R25, R36, R47 WERE 150Ω. Q5, Q7, Q9 WERE 001-021070. C8 WAS .27MF. C17 WAS .082MF. C44 WAS 13,100 PF.
B R56 THRU R59 WERE 100Ω.
C NOTE 3 ADDED.
D R3 WAS 3.3K. R4 WAS 270Ω. R5, R6, R15, R16, R26, R27, R37, R38, R48 & R49 WERE 13K. R14, R25, R36, R47 WERE 180Ω. R13, R24, R35, R46 WERE 3.9K. ADDED C46, C47, C48, C49 & C50. C7 CONNECTED TO GROUND
NOTES:
1. IF OTHERWISE NOT SPECIFIED, RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ± 5 %.
2. CAPACITOR VALUES ARE, AS FOLLOWS:
POLYSTYRENE CAPACITOR VALUES ARE IN PICOFARADS, ± 2.5 %;
MYLAR CAPACITOR VALUES ARE IN MICROFARADS, ± 10 %;
ALL 100 PF CAPACITORS & C45 ARE CERAMIC, ± 10 %.
3. FILTERS #1 & #2 ARE NOT USED ON P.W. BOARD 124-000310.
FILTER BD #1
J101
Q2
C8 .33
R10 22K
C50 100pf
R9 22K
Q4
C17
R21 33K
C49 100 pf
C16
R20 22K
Q6
C26 .047
R32 47K
C48 100 pf
R31 22K
Q8
C35 .022
R43 62K
C47 100 pf
R42 22K
Q10
C44 9260pf
R54 82K
C46 100 pf
R53 22K
J101-1
+20V
C45 .01
J101-11
BUS OUTPUT TO PIN 9 ON 124-000202 P.W. BOARD
FROM GENERATOR BOA
J5-12 -11 -9 -7 -5
J103 -9 -8 -7 -6 -5
Q3 Q10 Q7 Q4 Q1
FILTER 14 Q14,15
FILTER 13 Q11,12
FILTER 11 Q8,9
FILTER 9 Q5,6
FILTER 7 Q2,3
SINE FILTER P.W.B. ASY 124-000204
+20V
-1 -11
8
J101-10
J101-9
J101-12
PINS
N.C. PINS (NOT USED)
9
NO JEDEC PART NO.
2N5826
2N3394

FIGURE 3-16
SINE WAVE FILTER #1
SCHEMATIC, LAYOUT AND THEORY
(124-000310)



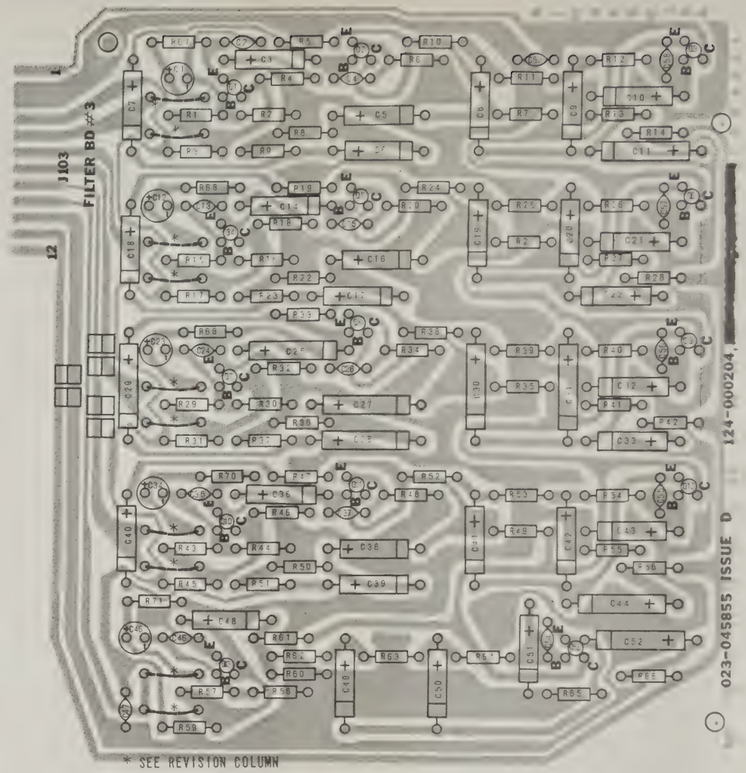
NOTES:

1. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±5 %.
2. CAPACITOR VALUES ARE AS FOLLOWS:
   MYLAR CAPACITORS, ±10 % AND ELECTROLYTIC CAPACITORS WITH THEIR VALUES AND WORKING VOLTAGES SHOWN, ARE IN MICROFARADS;
   POLYSTYRENE CAPACITOR VALUES ARE IN PICOFARADS, ± 2.5 %;
   C53 AND ALL 100 PF & 220 PF CAPACITORS ARE CERAMIC, ± 10 %.

QTY	DESIGNATION SYMBOL	HAMMOND PART NO.	JEDEC PART NO.
5	Q1,Q4,Q7,Q10,Q13	001-021172	2N4249
4	Q2,Q5,Q8,Q11	001-021260	2N5826
5	Q3,Q6,Q9,Q12,Q14	001-021135	2N3394

124-000204
094-045859-C

REVISIONS			
A	R2,R16,R30,R44,R58 WERE 120Ω..R7,R21,R35,R49 WERE 3.3K..R6,R20,R34 WERE 150Ω..R48 WAS 120Ω. Q2,Q5,Q8,Q11 WERE 001-021070. C11 WAS 4,630 PF. C22 WAS 3,270 PF. C33 WAS 1,160 PF.	C	R21,R35,R49 WERE 3.9 K..R34 WAS 160Ω..R48 WAS 150Ω..R8,R9,R22,R23,R36,R37,R50,R51 WERE 13 K.
B	R1,R15,R29,R43,R57 WERE 120Ω..R2,R16,R30, R44,R58 WERE 330Ω.		
C	ADDED C54 THRU C58, R6 & R20 WERE 180Ω..R7,		



* SEE REVISION COLUMN

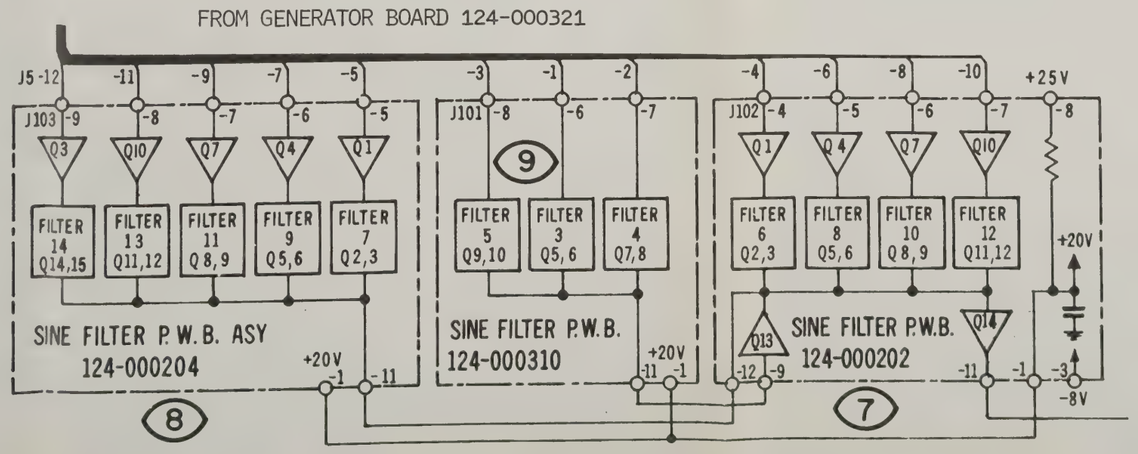
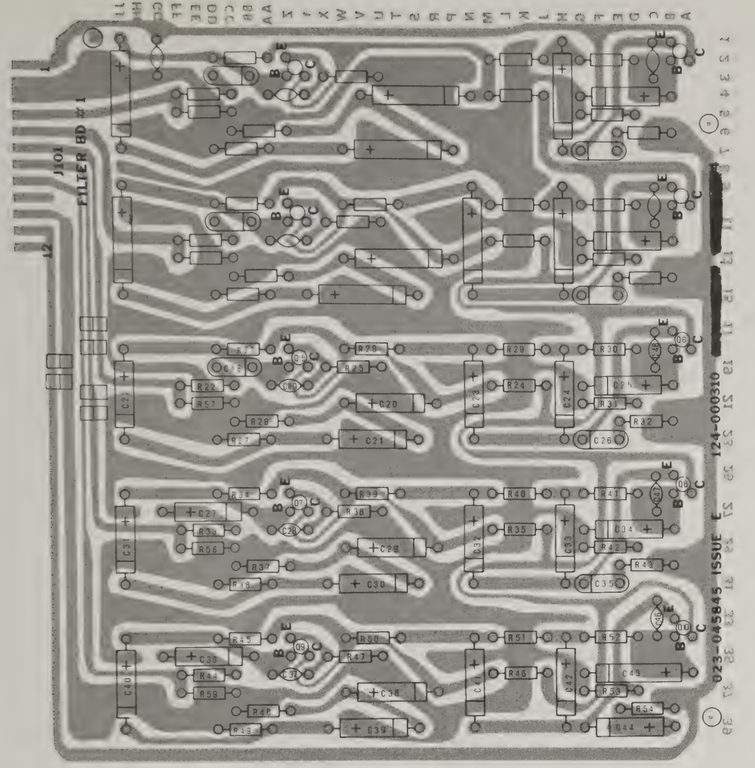
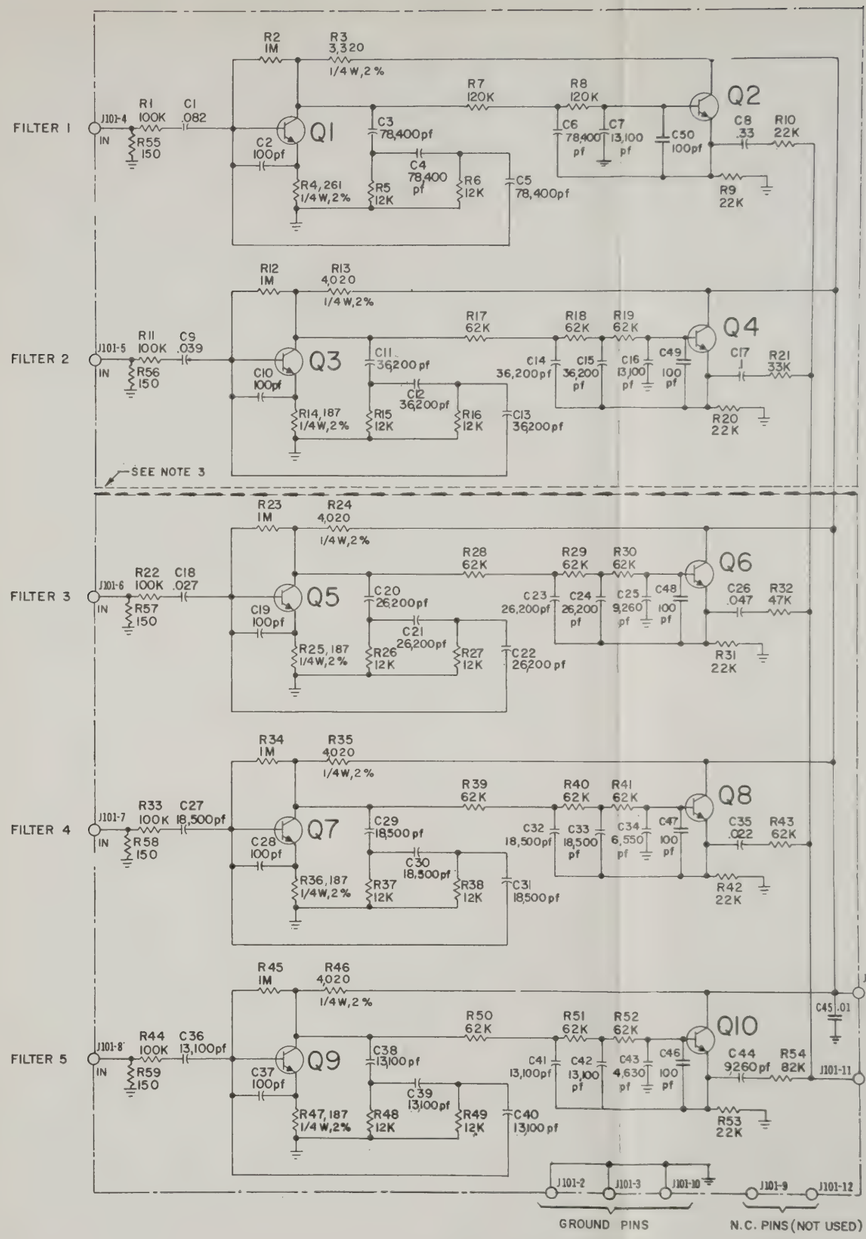


FIGURE 3-15
SINE WAVE FILTER #3
SCHEMATIC, LAYOUT AND THEORY
(124-000203)

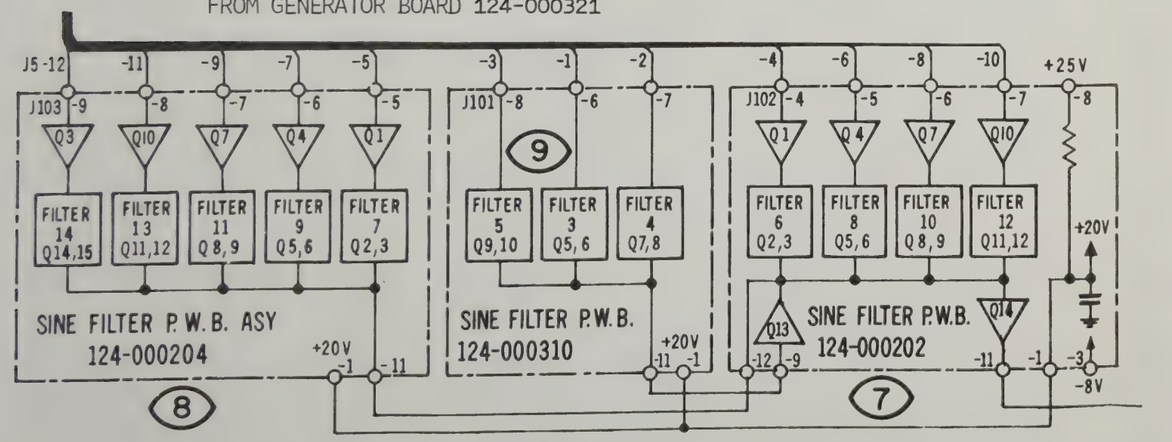




REVISIONS	
A	R4 WAS 220Ω. R10 WAS 27K. R13, R24, R35, R46 WERE 3.3 K. R21 WAS 39 K. R43 WAS 68 K. R14, R25, R36, R47 WERE 150Ω. Q5, Q7, Q9 WERE 001-021070. C8 WAS .27 MF. C17 WAS .082 MF. C44 WAS 13,100 PF.
B	R55 THRU R59 WERE 100Ω.
C	NOTE 3 ADDED.
D	R3 WAS 3.3 K. R4 WAS 270Ω. R5, R6, R15, R16, R26, R27, R37, R38, R48 & R49 WERE 13 K. R14, R25, R36, R47 WERE 180Ω. R13, R24, R35, R46 WERE 3.9 K. ADDED C46, C47, C48, C49 & C50. C7 CONNECTED TO GROUND.

NOTES:

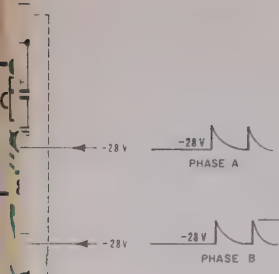
1. IF OTHERWISE NOT SPECIFIED, RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ± 5 %.
2. CAPACITOR VALUES ARE, AS FOLLOWS:
   POLYSTYRENE CAPACITOR VALUES ARE IN PICOFARADS, ± 2.5 %;
   MYLAR CAPACITOR VALUES ARE IN MICROFARADS, ± 10 %;
   ALL 100 PF CAPACITORS & C45 ARE CERAMIC, ± 10 %.
3. FILTERS #1 & #2 ARE NOT USED ON P.W. BOARD 124-000310.



QTY	DESIGNATION SYMBOL	HAMMOND PART NO.	JEDEC PART NO.
5	Q1, Q3, Q5, Q7, Q9	001-021260	2N5826
5	Q2, Q4, Q6, Q8, Q10	001-021135	2N3394

124-000310
094-045849-D

FIGURE 3-16
SINE WAVE FILTER #1
SCHEMATIC, LAYOUT AND THEORY
(124-000310)

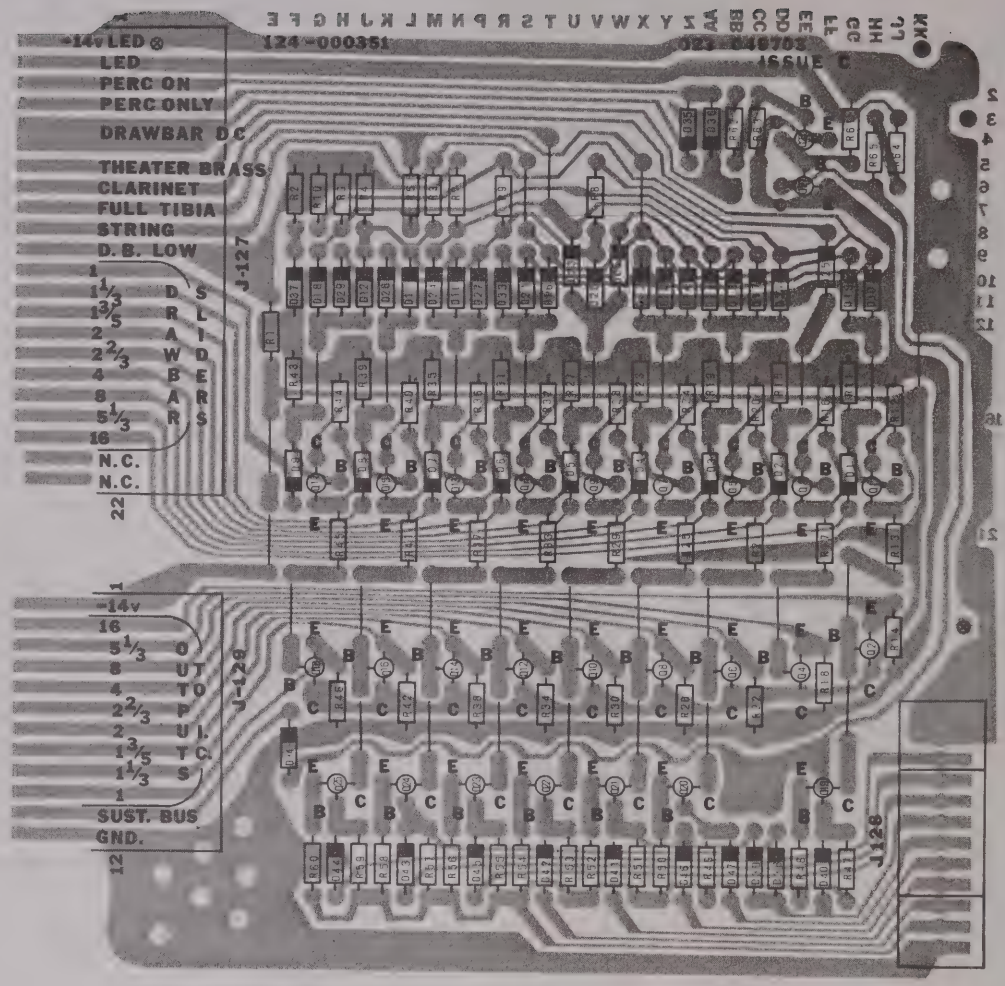


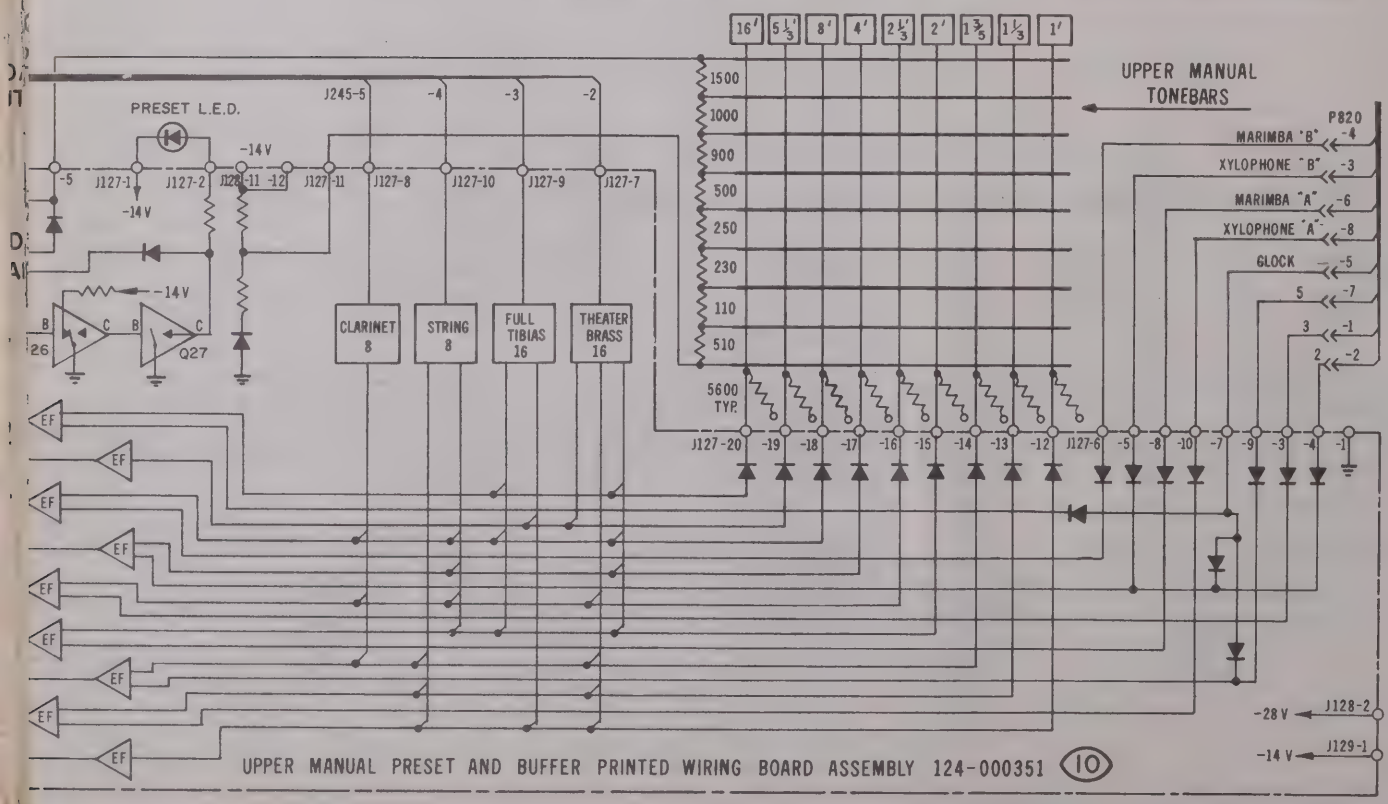
NOTES:

1. IF OTHERWISE NOT SPECIFIED:
   ALL RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±10%.
2. SYMBOL "○" INDICATES EDGE CONNECTOR PIN AND IT'S NUMBER.

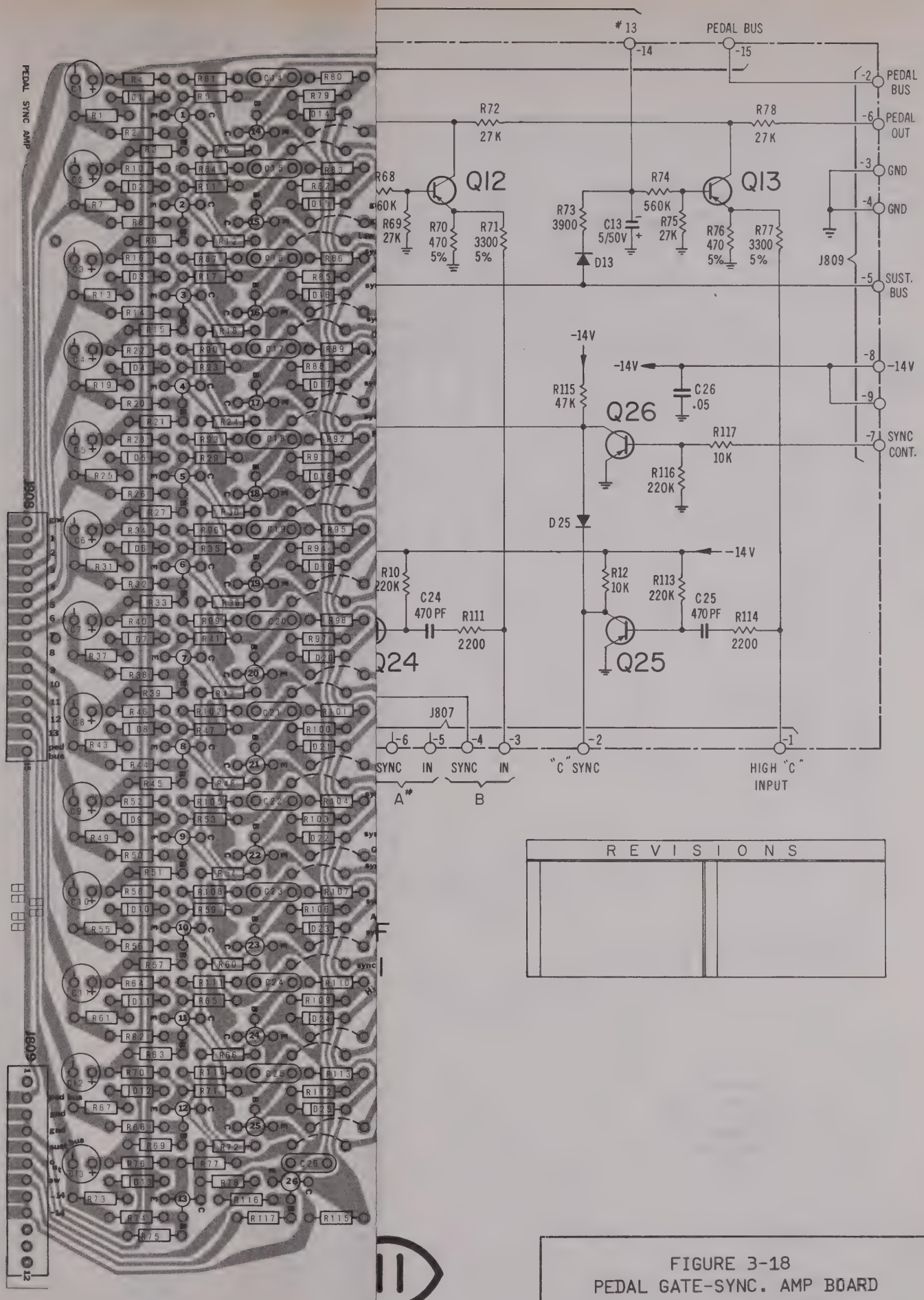
QTY	DESIGNATION SYMBOL	HAMMOND PART NO.	JEDEC PART NO.
20	Q1 THRU Q18 & Q26,Q27	001-021172	2N 4249
7	Q19 THRU Q25	001-021134	2N 3394
47	D1 THRU D47	001-026080	1N 4148

REVISIONS		
A	R64 AND R65 WERE 350 OHMS.	



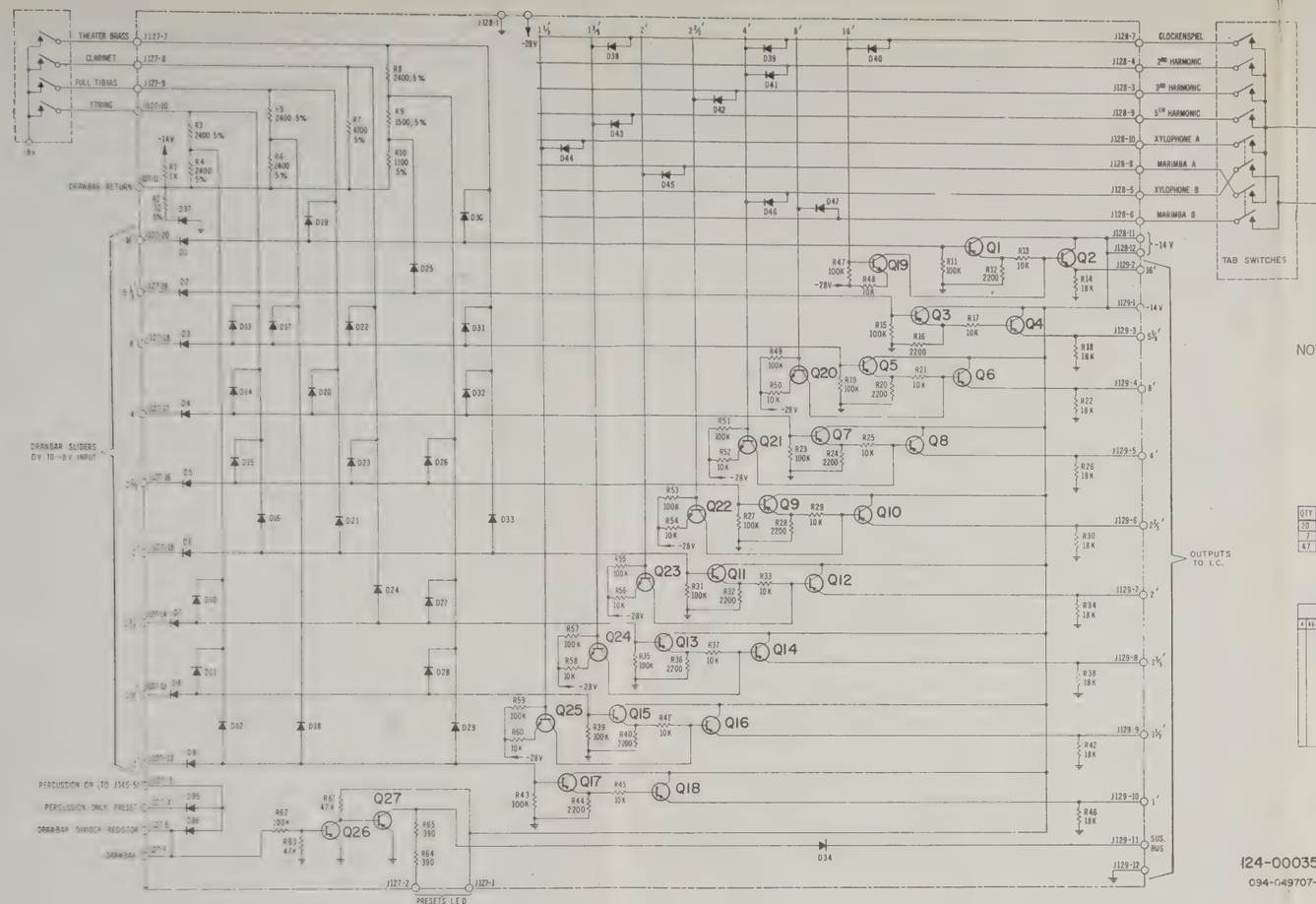


UPPER MANUAL PRESET AND BUFFER PRINTED WIRING BOARD ASSEMBLY 124-000351 (10)



REVISIONS		

FIGURE 3-18
PEDAL GATE-SYNC. AMP BOARD
SCHEMATIC AND LAYOUT
(124-000361)



NOTES:

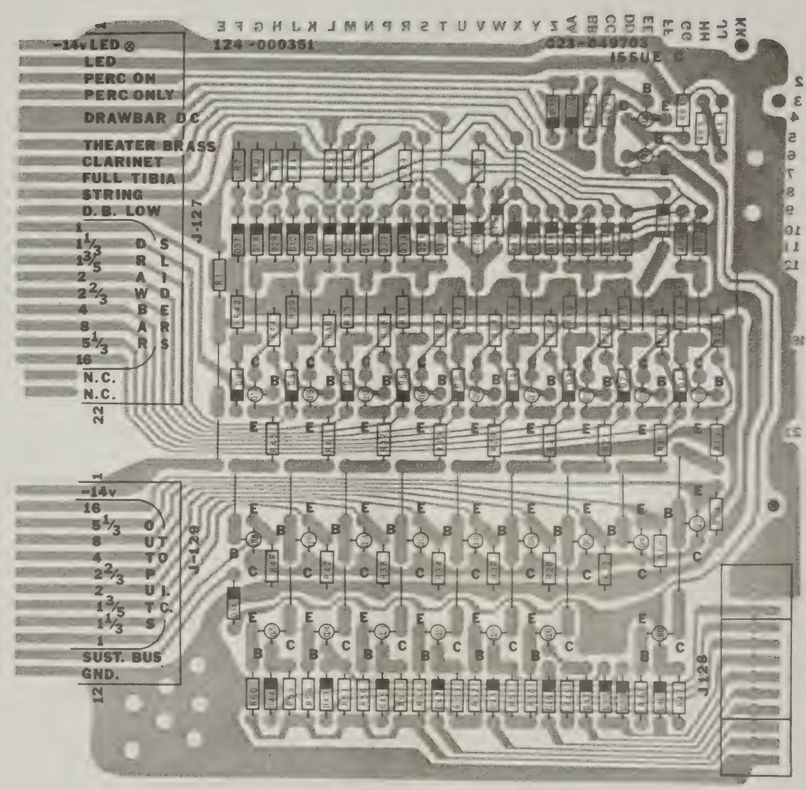
1. IF OTHERWISE NOT SPECIFIED:
   ALL RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±10%.
2. SYMBOL ○ INDICATES EDGE CONNECTOR PIN AND IT'S NUMBER.

QTY	DESIGNATION SYMBOL	HAMMOND PART NO.	JEDEC PART NO.
70	Q1 THRU Q18 & Q26,Q27	001-021172	2N4249
7	Q19 THRU Q25	001-021134	2N3394
47	D1 THRU D47	001-026080	1N4148

REVISIONS

A R66,AND R65 WERE 150 OHMS

124-000351
094-049707-A



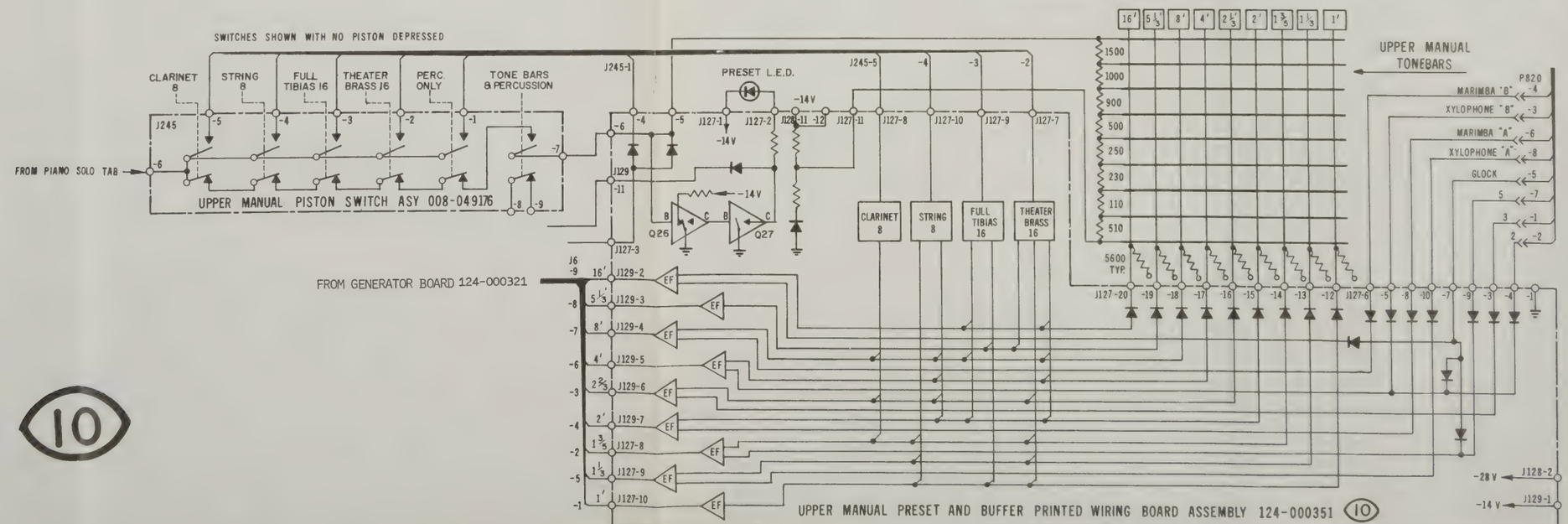
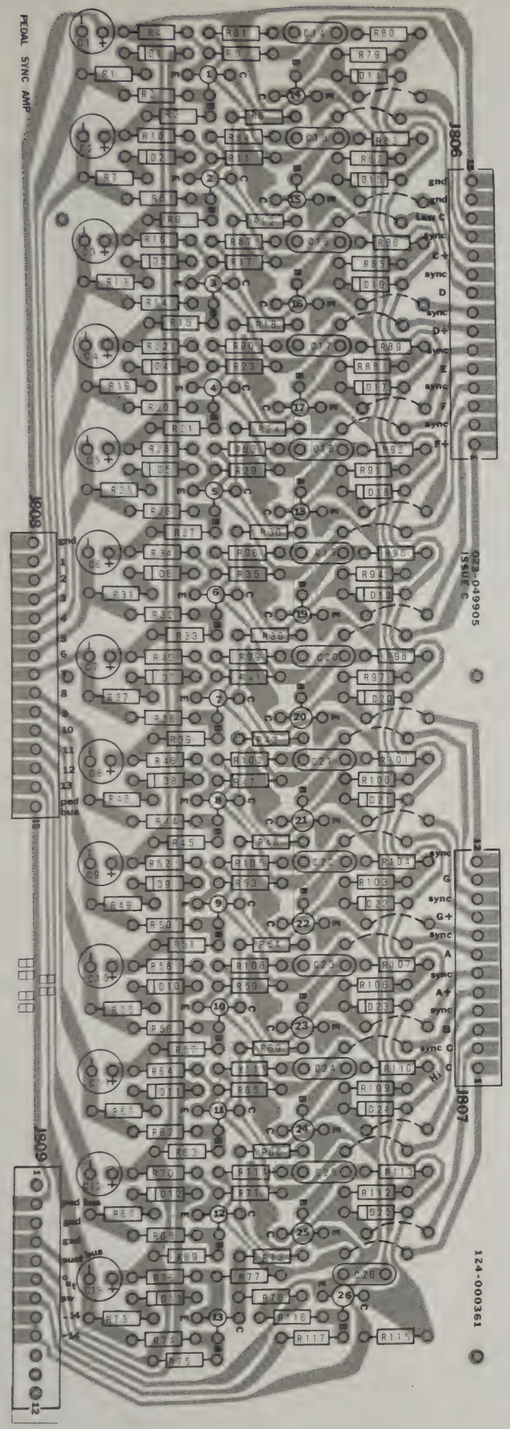
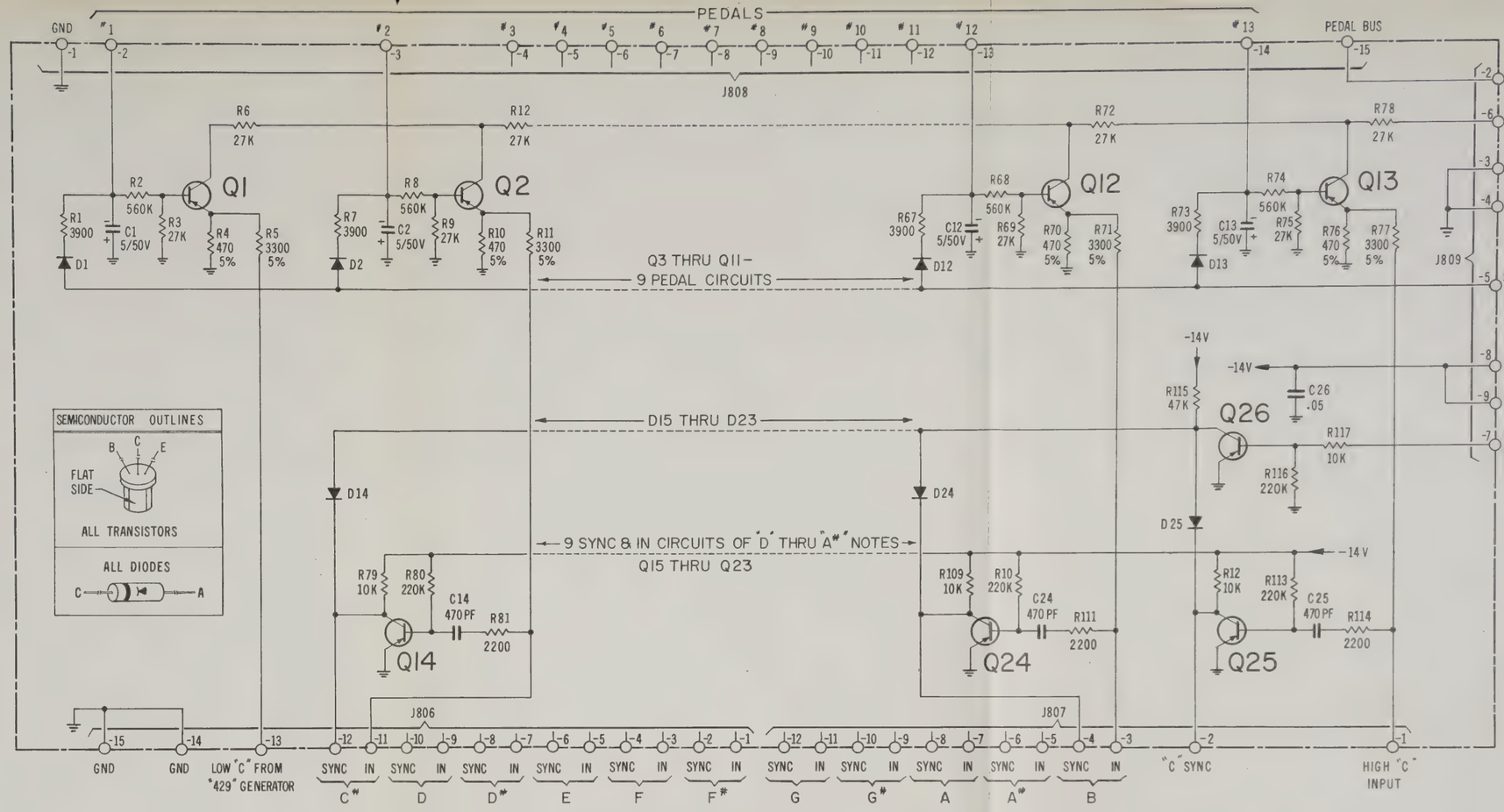


FIGURE 3-17
UPPER MANUAL PRESETS BOARD
SCHEMATIC AND LAYOUT
(124-000351)

(10)





NOTES:

1. IF OTHERWISE NOT SPECIFIED:
   ALL RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±10%;
   ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. SYMBOL -7- INDICATES PIN & IT'S NO. IN ONE OF FOUR CONNECTORS: J806, J807, J808 OR J809.

QTY	DESIGNATION SYMBOL	HAMMOND PART NO.	JEDEC PART NO.
26	Q1 THRU Q26	001-021172	2N 4249
25	D1 THRU D25	001-026080	1N 4148

094-050380-0, SCHEMATIC DIAGRAM OF PEDAL GATE & SYNC P.W.B. 124-000361

REVISIONS

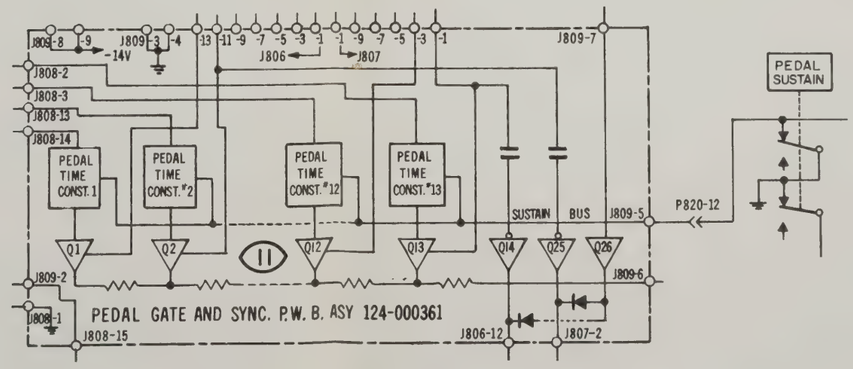
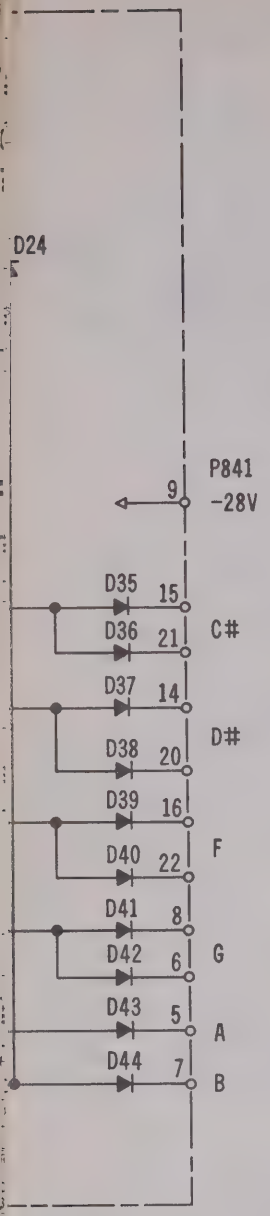
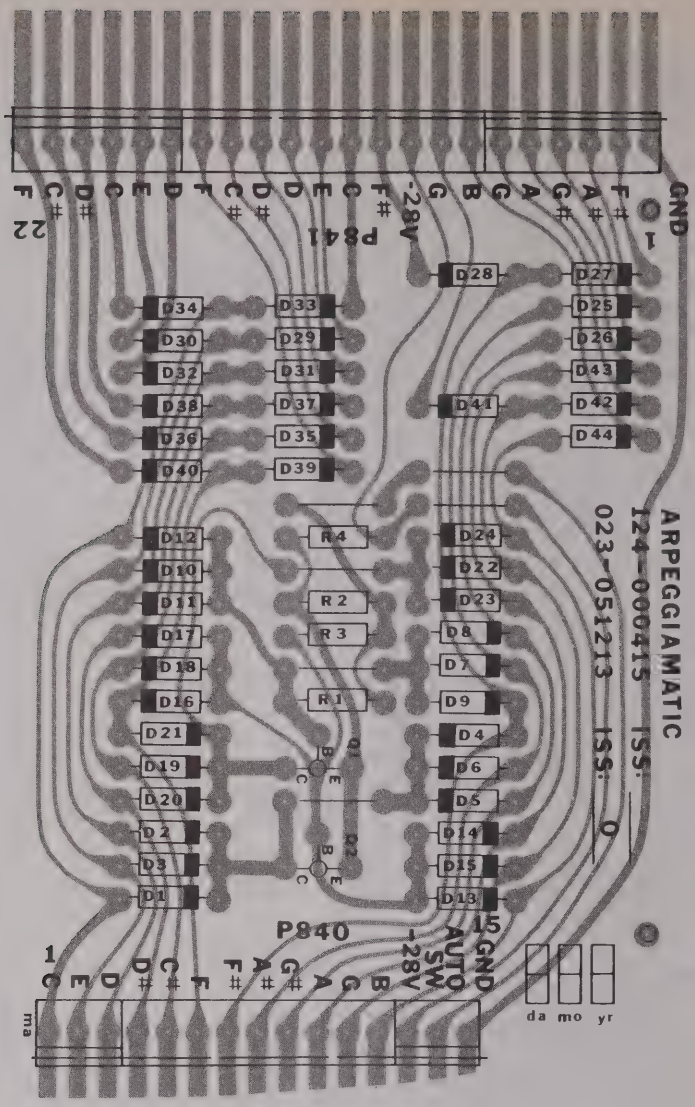
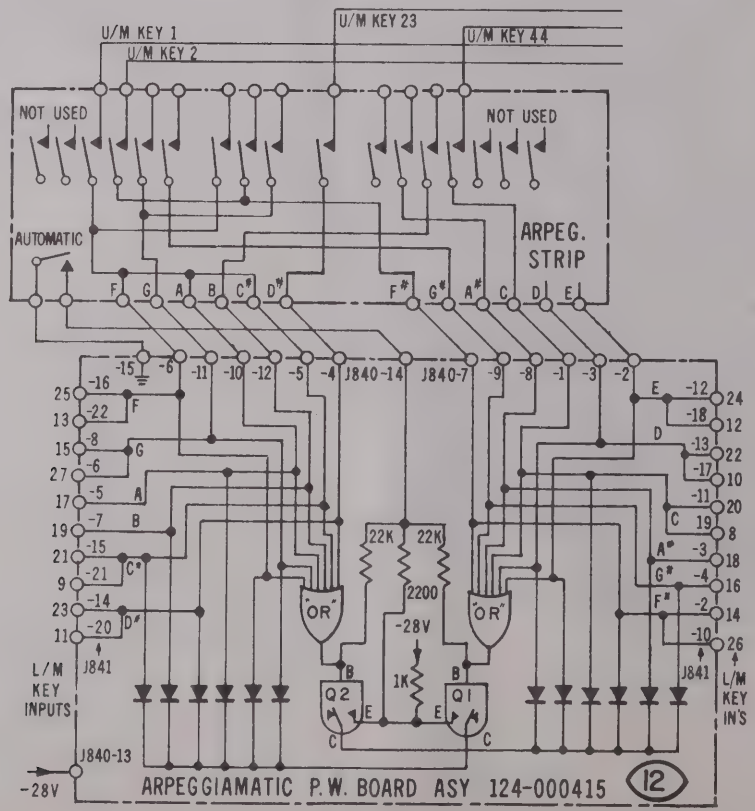


FIGURE 3-18
PEDAL GATE-SYNC. AMP BOARD
SCHEMATIC AND LAYOUT
(124-000361)


D24
P841
9
-28V
D35 15
D36 21 C#
D37 14
D38 20 D#
D39 16
D40 22 F
D41 8
D42 6 G
D43 5 A
D44 7 B


P841
P840
D28
D27
D34
D33
D30
D29
D32
D31
D38
D37
D36
D35
D40
D39
D41
D42
D44
D25
D26
D43
D12
D10
D11
D17
D18
D16
D21
D19
D20
D2
D3
D1
R4
R2
R3
R1
D24
D22
D23
D8
D7
D9
D4
D6
D5
D14
D15
D13
Q1
Q2
ARPEGGIAMATIC
124-000415 ISS.
023-051213 ISS. 0
AUTO SW
-28V
GND
da mo yr


U/M KEY 1
U/M KEY 2
U/M KEY 23
U/M KEY 44
NOT USED
NOT USED
AUTOMATIC
ARPEG. STRIP
J840-14
J840-7
22K
22K
2200
1K
-28V
OR
OR
Q2
Q1
L/M KEY INPUTS
J841
J841
L/M KEY IN'S
J840-13
-28V
ARPEGGIAMATIC P.W. BOARD ASY 124-000415
12

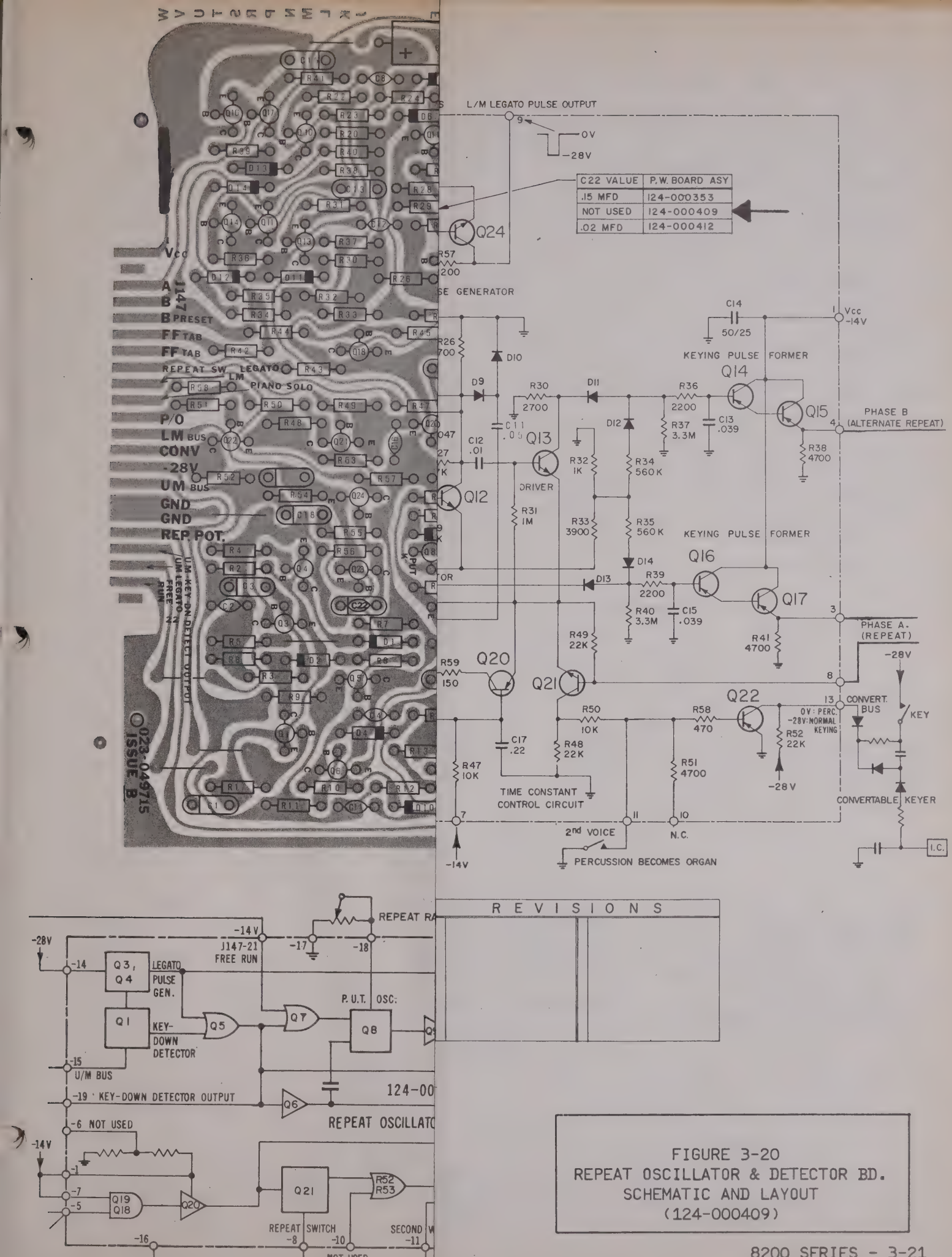
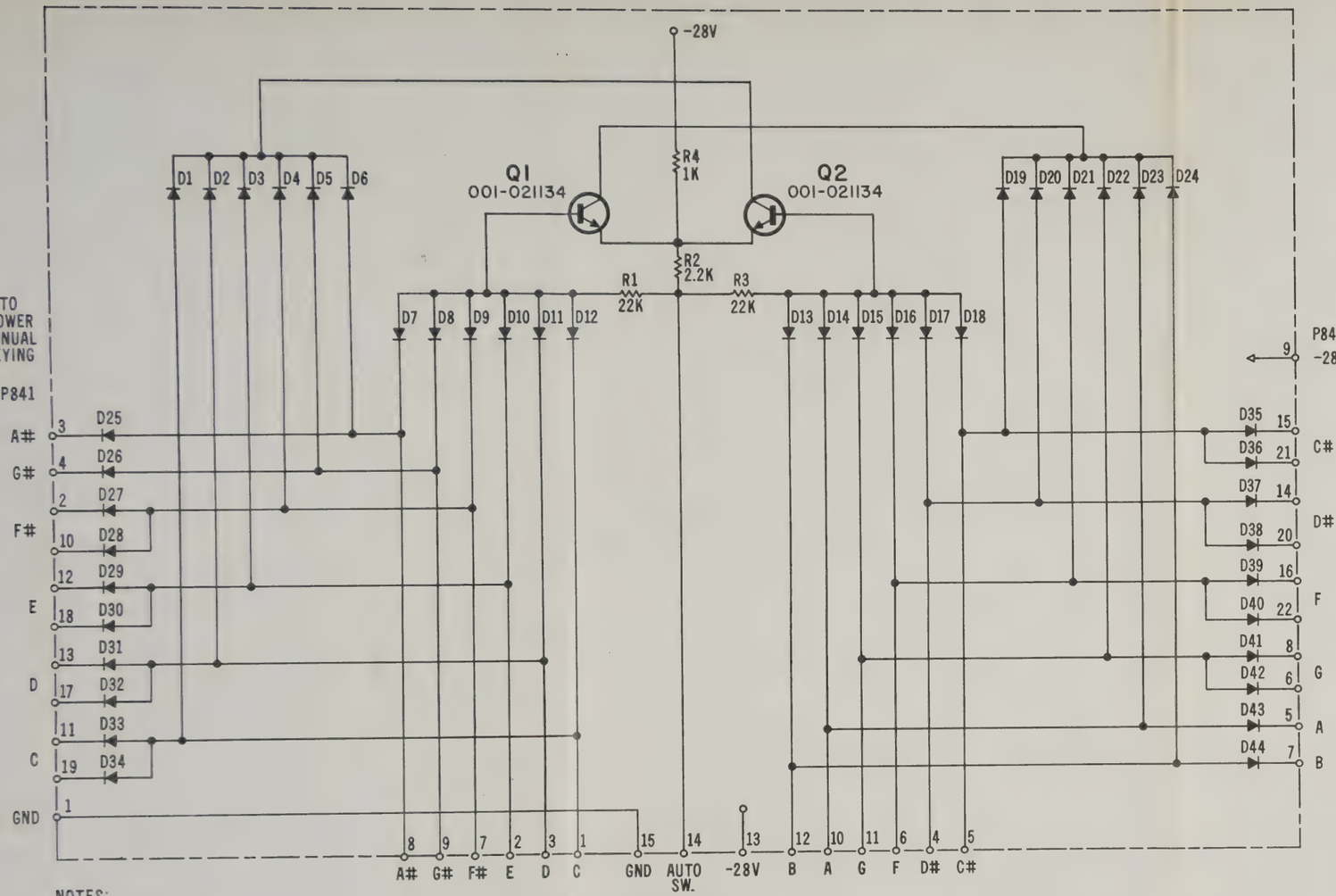


FIGURE 3-20
REPEAT OSCILLATOR & DETECTOR BD.
SCHEMATIC AND LAYOUT
(124-000409)



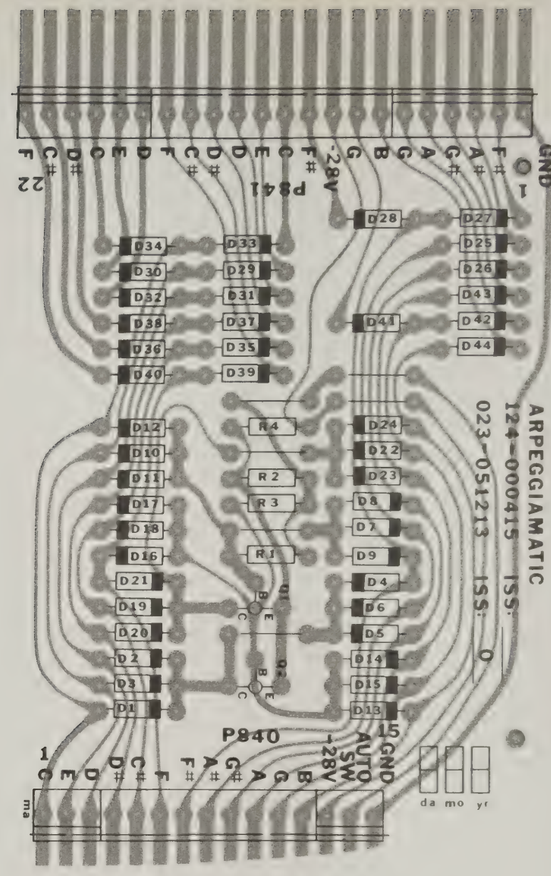
NOTES:
1. 001-0211341 Q1 & Q2
2. ARPEGGIAMATIC ASY. 124-000415
3. HIGHEST COMPONENT NUMBERS D44, Q2, R4

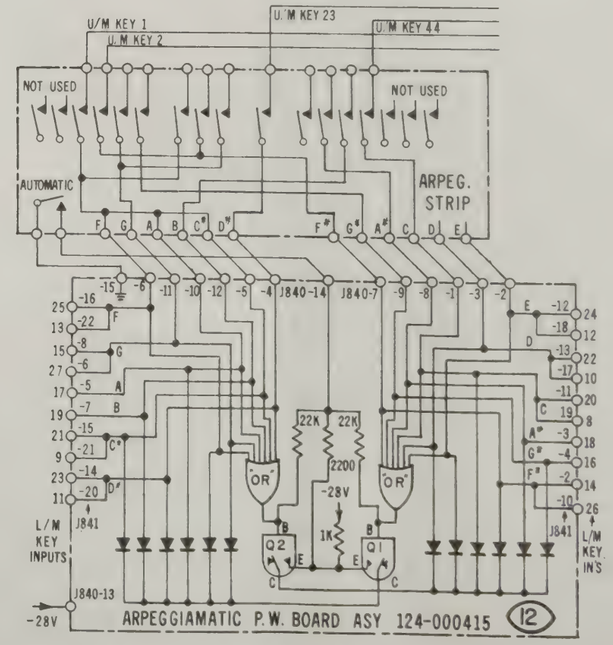
P840 (TO ARPEGGIATOR KEY PWB.)

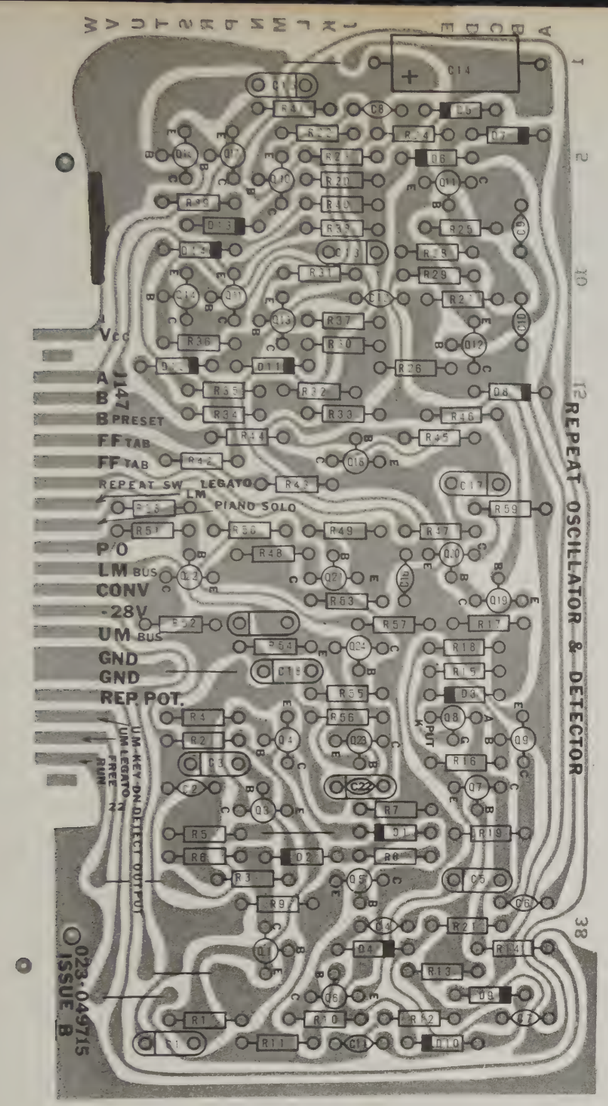
124-000415
094-051217-0

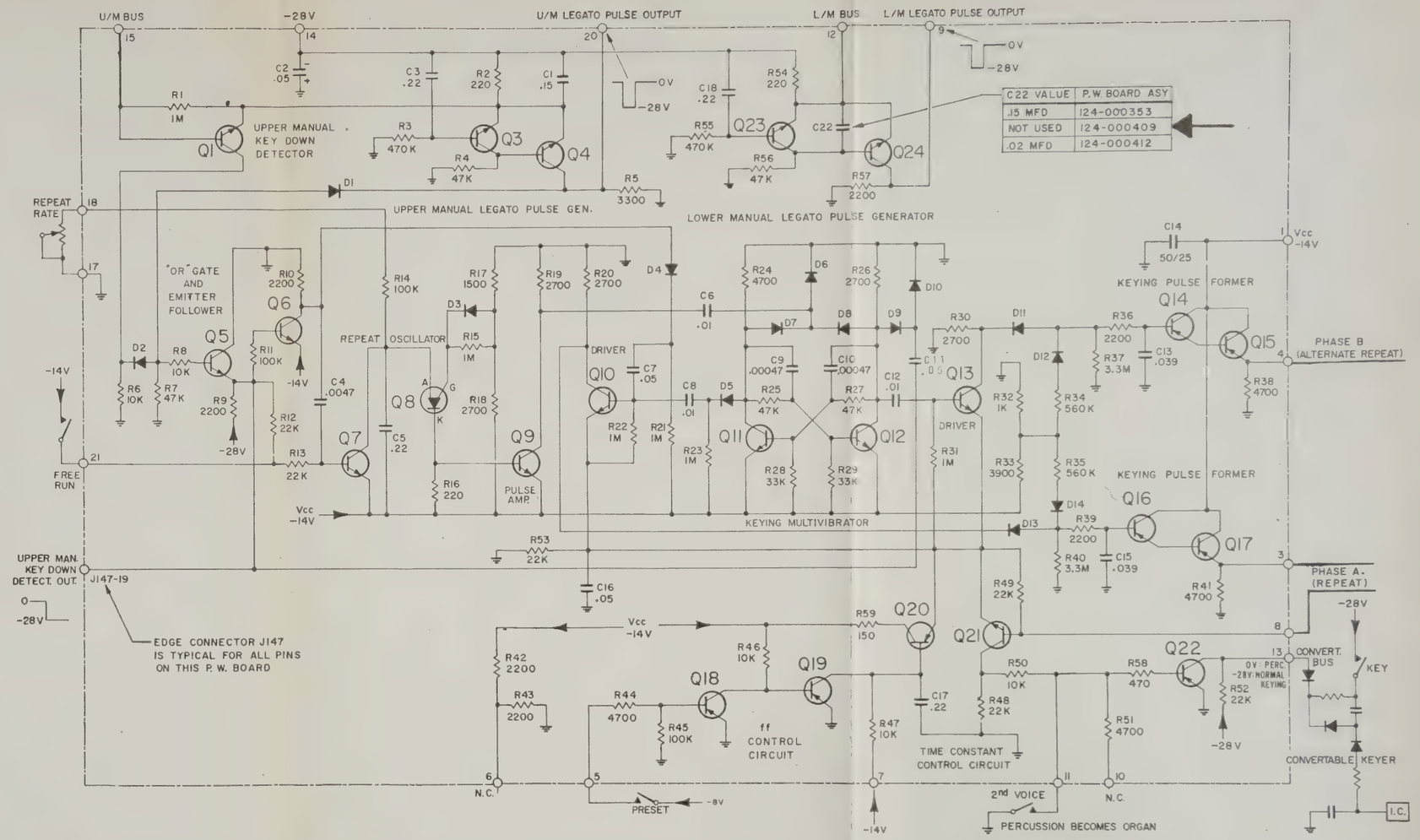
12

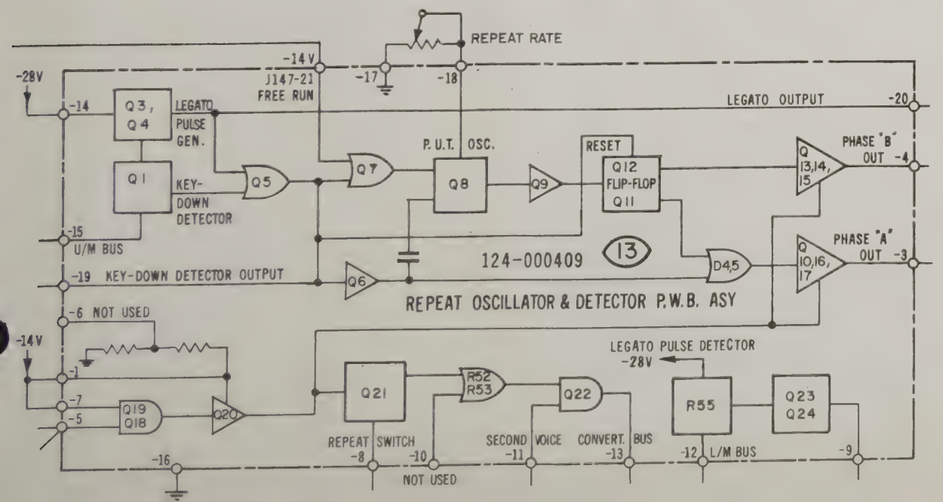
FIGURE 3-19
ARPEGGIAMATIC BOARD
SCHEMATIC, LAYOUT AND THEORY
(124-000415)











NOTES:

1. SEE C22 VALUE CHART FOR P.W. BOARD ASY NO.
2. UNLESS OTHERWISE SPECIFIED: ALL RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±10%; ALL CAPACITOR VALUES ARE IN MICROFARADS.
3. UNLESS OTHERWISE SHOWN, ALL SWITCHES ARE IN "OFF" POSITION.
4. SYMBOL ⊙7 INDICATES PIN NO. OF CONNECTOR J147.

QTY	DESIGNATION SYMBOL	HAMMOND PART #	JEDEC PART #
14	Q1,Q3,Q4 THRU Q7, Q9 THRU Q13,Q21,Q23,Q24	001-021134	2N 3394
1	Q8 (PUT)	001-026050	2N 6027
8	Q14 THRU Q20 & Q22	001-021172	2N 4249
14	D1 THRU D14	001-026080	IN 4148

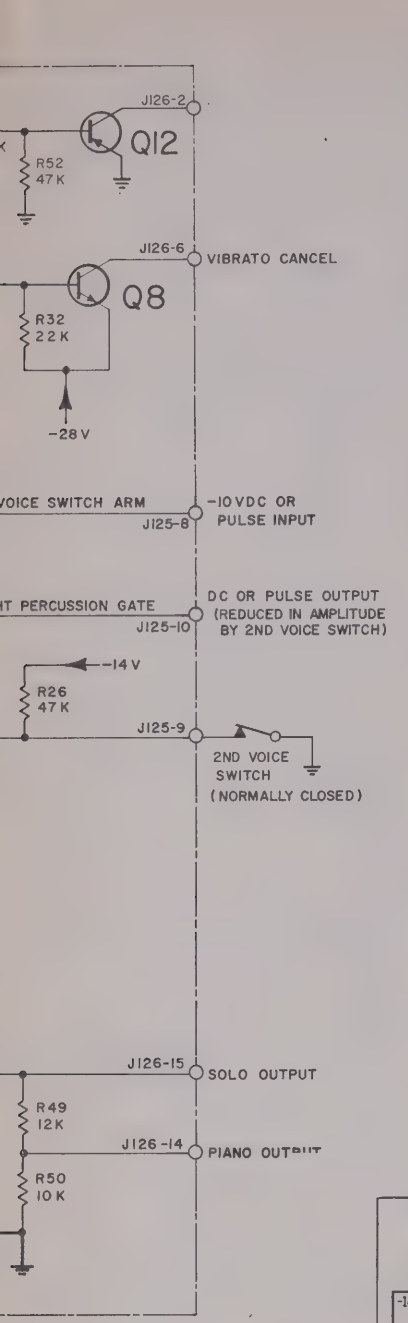
REPEAT OSCILLATOR AND DETECTOR
124-000409

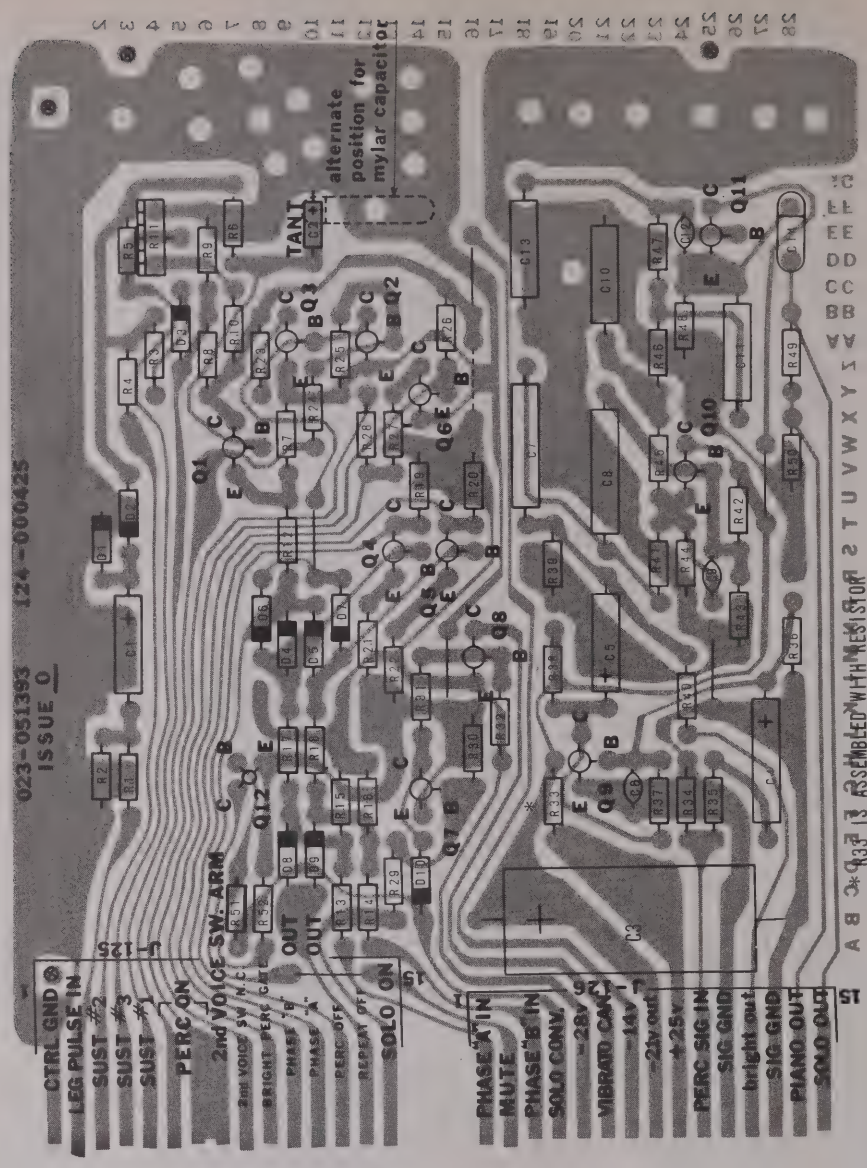
094-049719-A

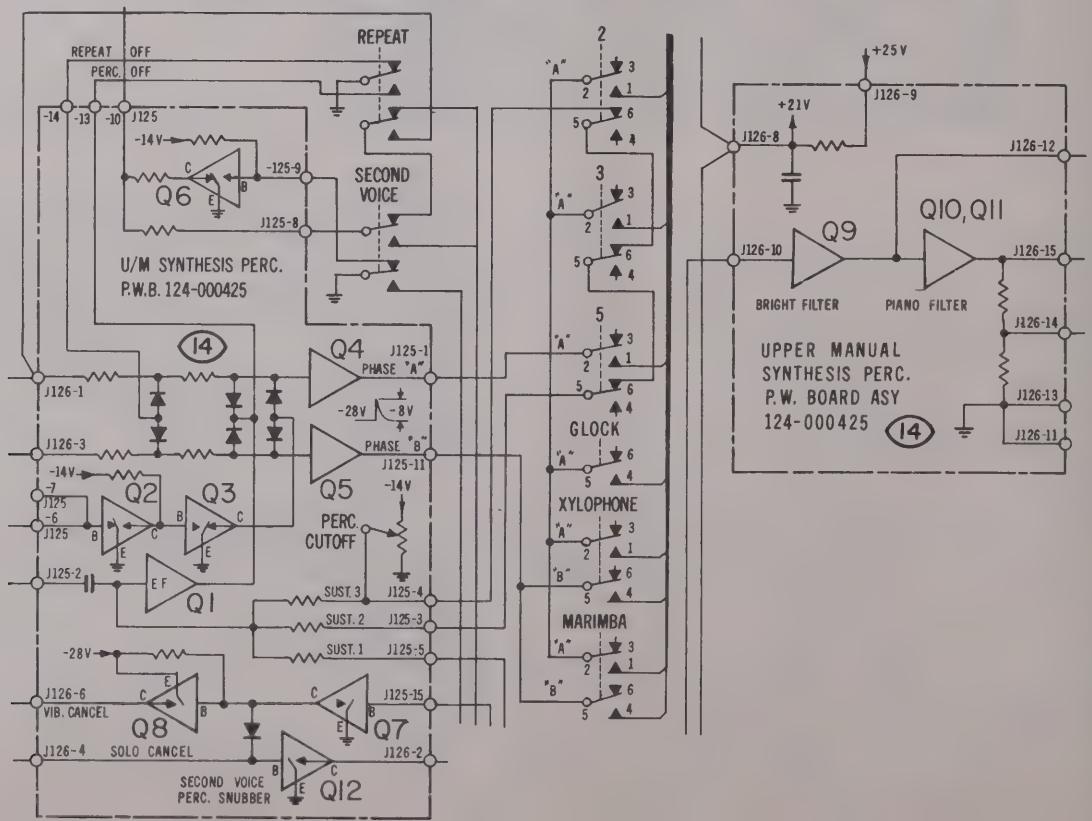
REVISIONS

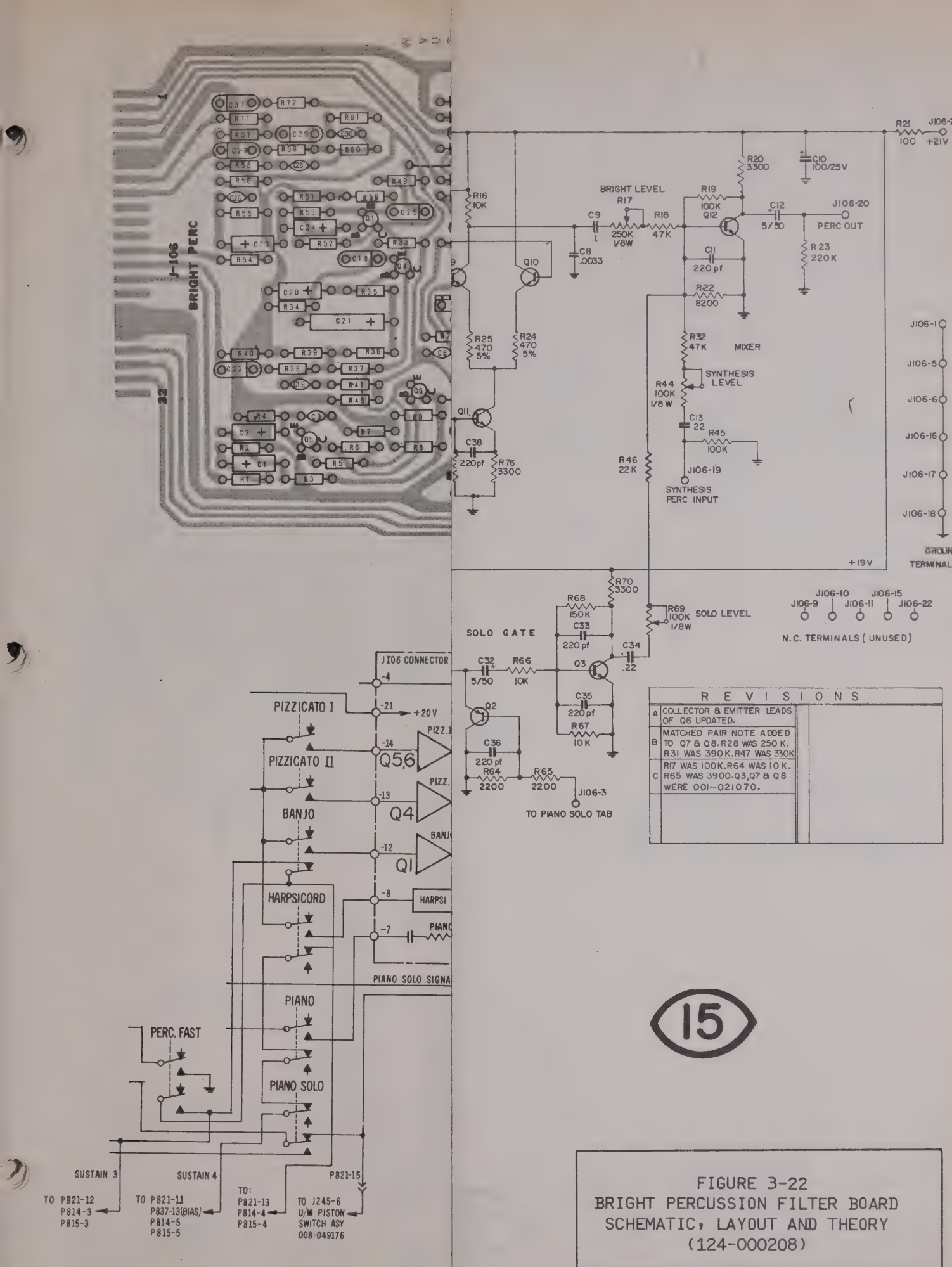
13

FIGURE 3-20
REPEAT OSCILLATOR & DETECTOR BD.
SCHEMATIC AND LAYOUT
(124-000409)


J126-2
Q12
R52
47K
J126-6
VIBRATO CANCEL
Q8
R32
22K
-28V
VOICE SWITCH ARM
J125-8
-10VDC OR
PULSE INPUT
T PERCUSSION GATE
J125-10
DC OR PULSE OUTPUT
(REDUCED IN AMPLITUDE
BY 2ND VOICE SWITCH)
-14V
R26
47K
J125-9
2ND VOICE
SWITCH
(NORMALLY CLOSED)
J126-15
SOLO OUTPUT
R49
12K
J126-14
PIANO OUTPUT
R50
10K


alternate
position for
mylar capacitor
023-051393
ISSUE 0
124-000425
CTRL GND
LEG PULSE IN
SUST #2
SUST #3
SUST #1
PERC ON
2nd VOICE SW ARM
OUT
OUT
SOLO ON
PHASE "A" IN
MUTE
PHASE "B" IN
SOLO CONV.
-28V
VIBRATO CAN
-14V
+25V
PERC SIG IN
SIG GND
bright out
SIG GND
PIANO OUT
SOLO OUT
BODY PERPENDICULAR TO PWB.

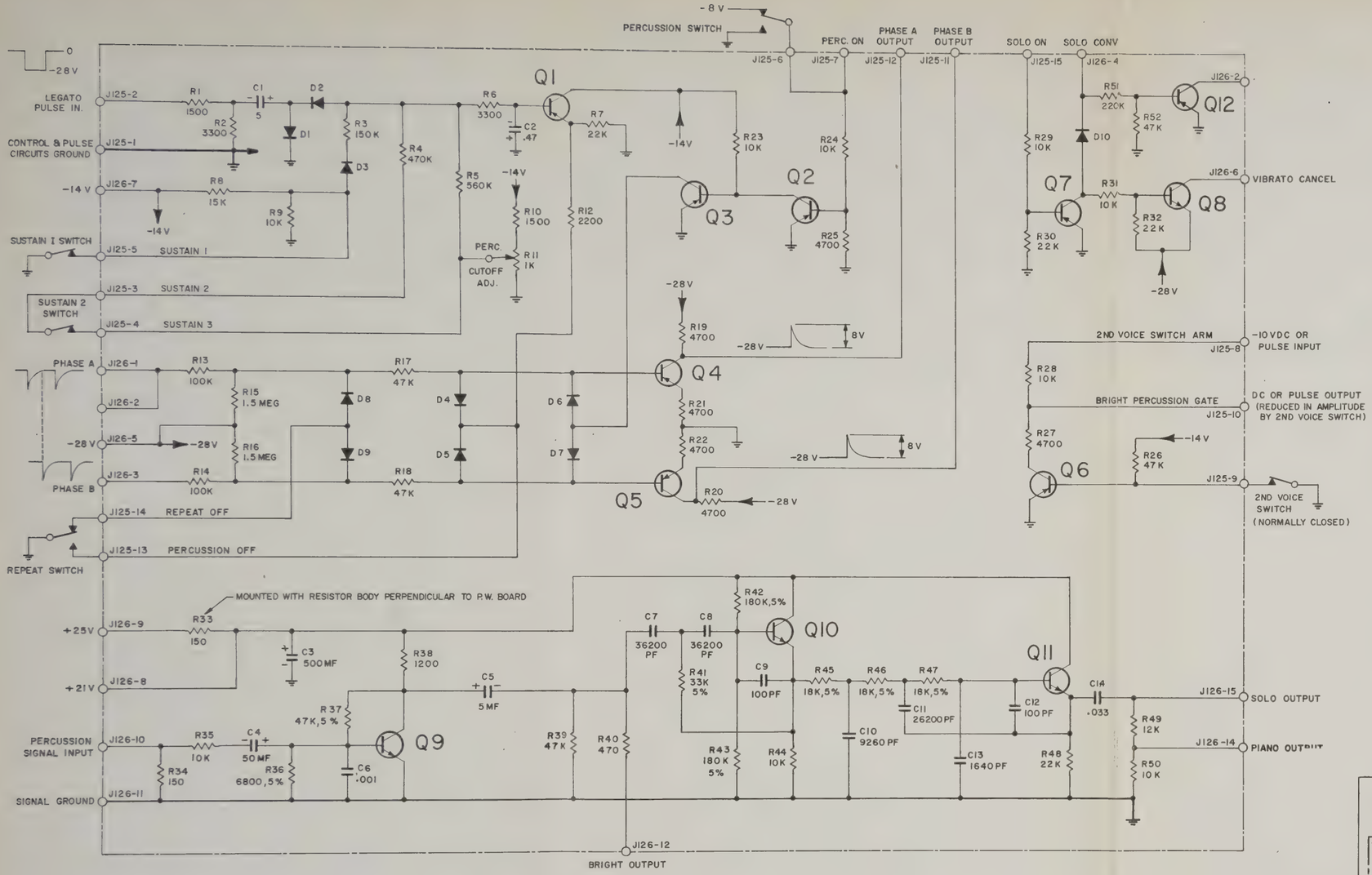

REPEAT
REPEAT OFF
PERC. OFF
SECOND
VOICE
U/M SYNTHESIS PERC.
P.W.B. 124-000425
Q6
Q4
PHASE "A"
Q5
PHASE "B"
Q2
Q3
Q1
PERC.
CUTOFF
SUST. 3
SUST. 2
SUST. 1
Q8
VIB. CANCEL
SOLO CANCEL
Q7
Q12
SECOND VOICE
PERC. SNUBBER
GLOCK
XYLOPHONE
MARIMBA
+25V
+21V
Q9
Q10, Q11
BRIGHT FILTER
PIANO FILTER
UPPER MANUAL
SYNTHESIS PERC.
P.W. BOARD ASY
124-000425

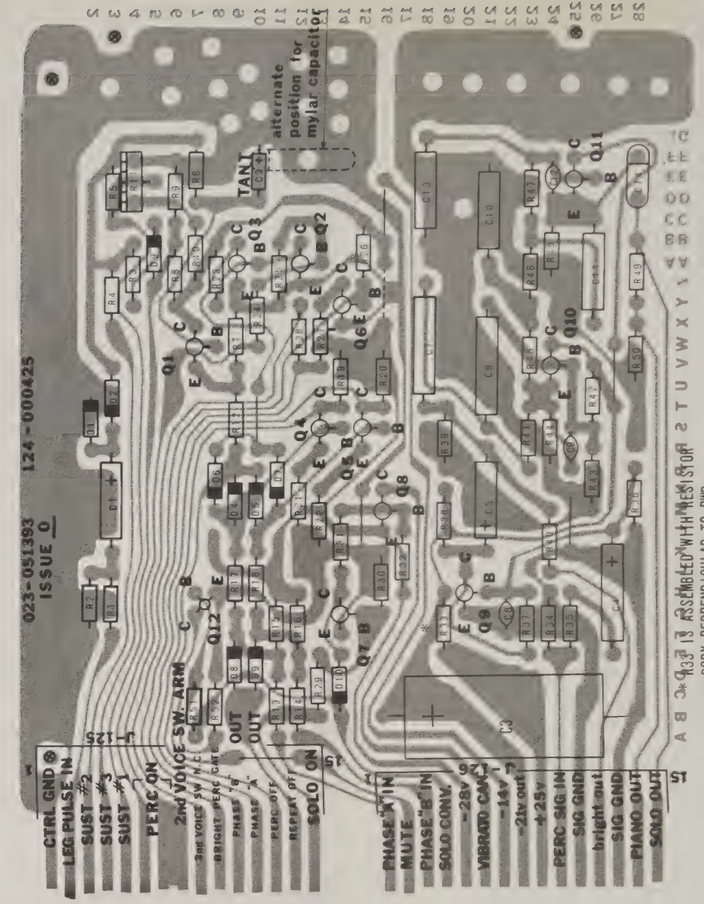


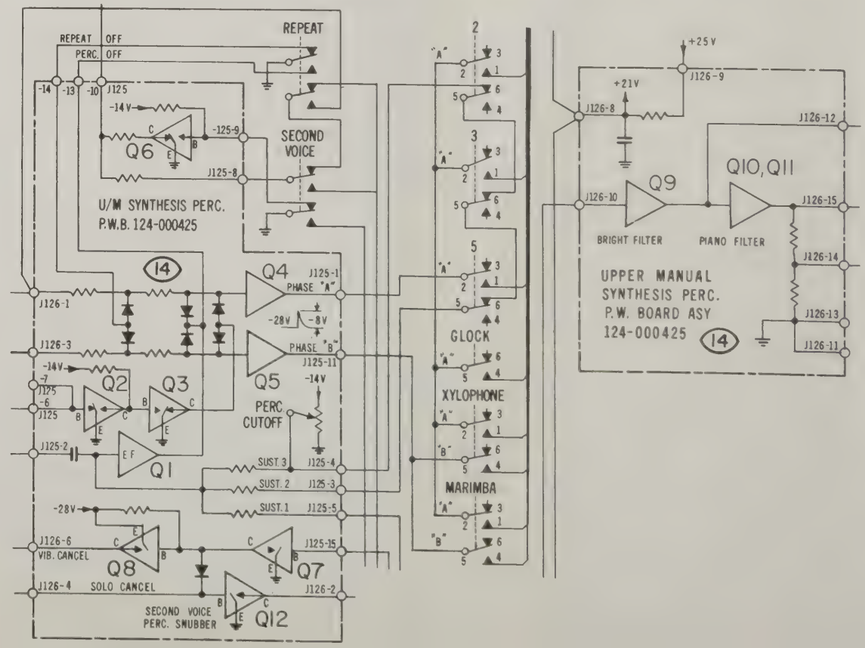
REVISIONS	
A	COLLECTOR & EMITTER LEADS OF Q6 UPDATED.
B	MATCHED PAIR NOTE ADDED TO Q7 & Q8. R28 WAS 250 K. R31 WAS 390 K. R47 WAS 330K
C	R17 WAS 100K. R64 WAS 10 K. R65 WAS 3900. Q3, Q7 & Q8 WERE 001-021070.

15

FIGURE 3-22
BRIGHT PERCUSSION FILTER BOARD
SCHEMATIC, LAYOUT AND THEORY
(124-000208)







NOTES:

1. UNLESS OTHERWISE SPECIFIED: ALL RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±10%; ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. SYMBOL ○— INDICATES PIN IN EDGE CONNECTOR. TWO EDGE CONNECTORS (J125 & J126) PIN NOS. SHOWN.
3. ALL SWITCHES ARE IN "OFF" POSITION, UNLESS OTHERWISE SHOWN.

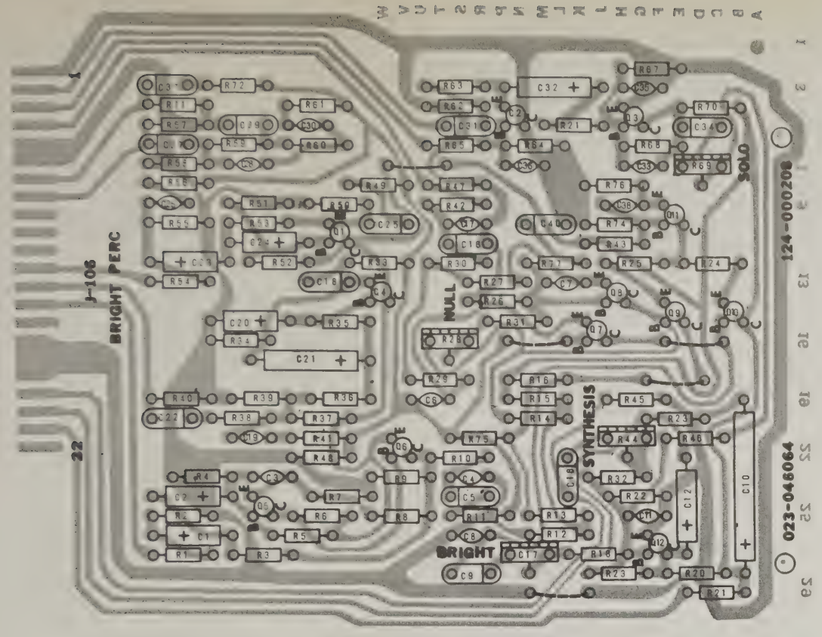
QTY	DESIGNATION SYMBOL	HAMMOND PART NO.	JEDEC PART NO.
8	Q1 THRU Q7 & Q12	001-021172	2N 4249
1	Q8	001-021133	2N 3394
3	Q9, Q10, Q11	001-021260	2N 5826
10	D1 THRU D10	001-026080	IN 4148

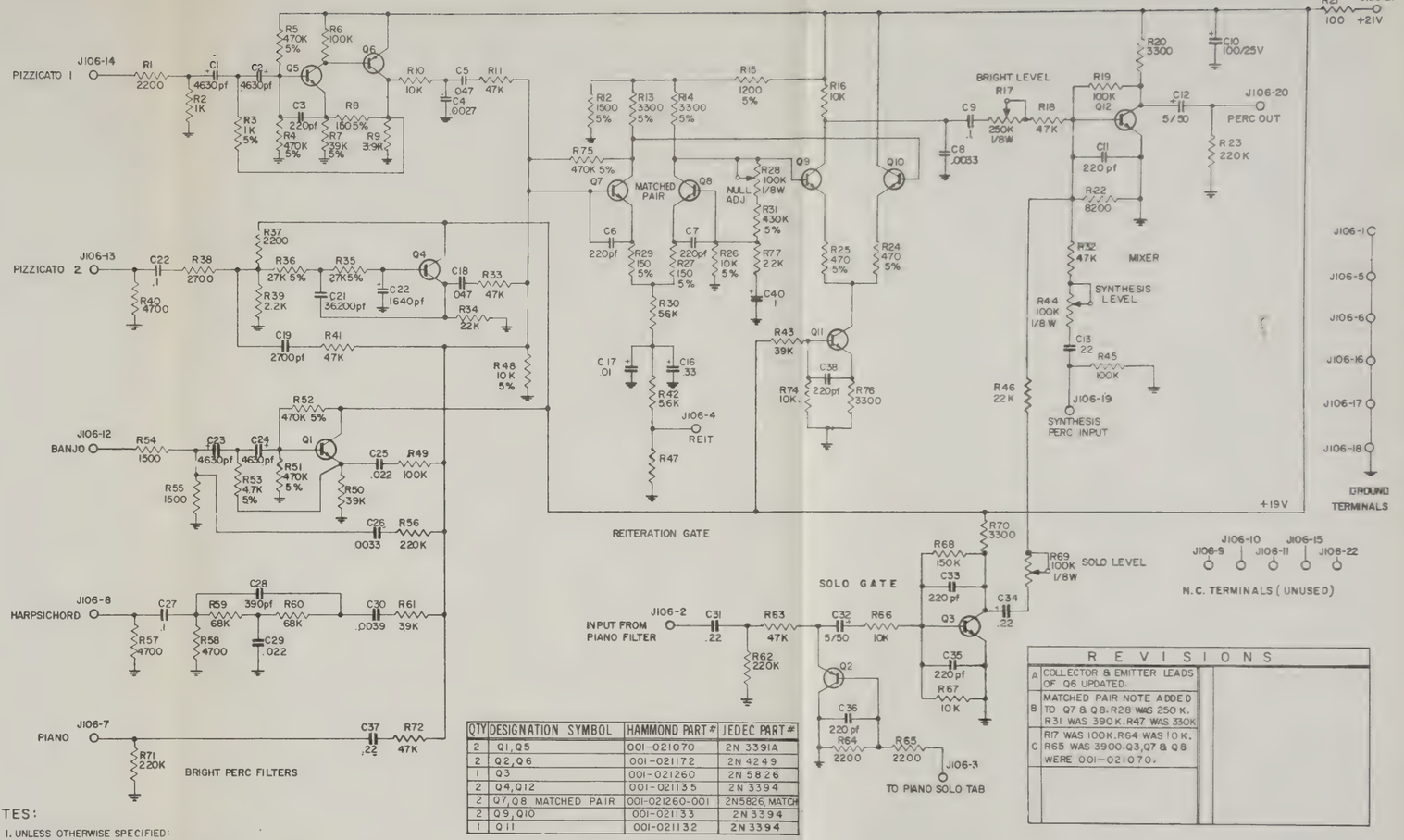
UPPER MANUAL SYNTHESIS PERCUSSION
124-000425
094-051397-B

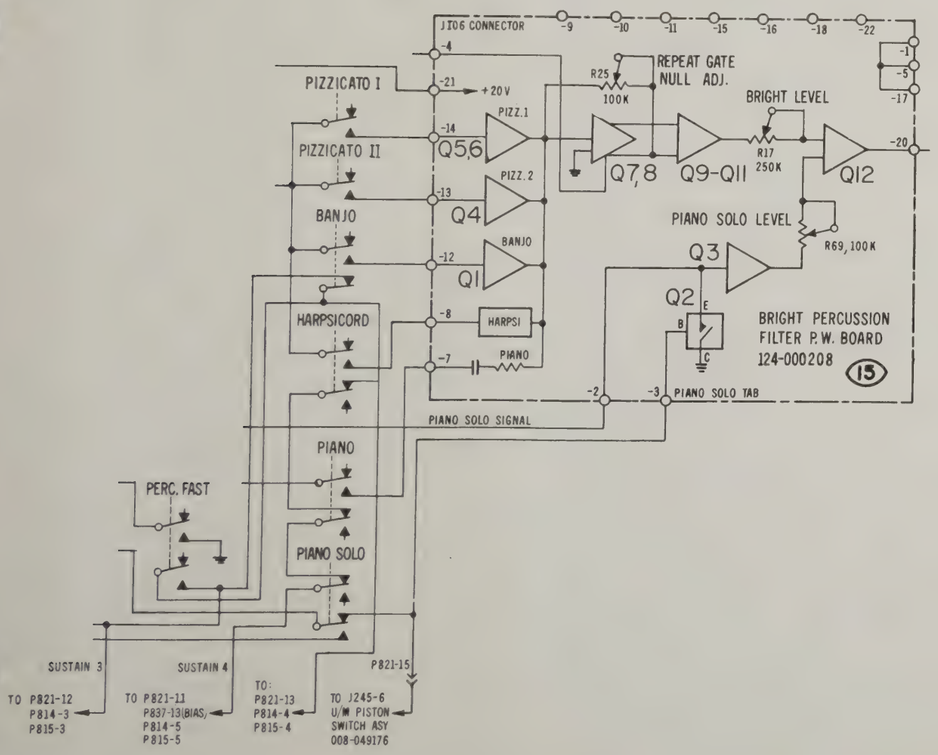
REVISIONS

FIGURE 3-21
UPPER MANUAL SYNTHESIS
PERCUSSION BOARD
SCHEMATIC, LAYOUT
(124-000425)

14







NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±10%;
   CAPACITOR VALUES ARE IN MICROFARADS,
   WITH VOLTAGES SHOWN FOR ELECTROLYTICS ONLY.
   CAPACITOR TOLERANCE - MYLAR & CERAMIC: ±10%, POLYSTYRENE: ±2.5%.

QTY	DESIGNATION SYMBOL	HAMMOND PART #	JEDEC PART #
2	Q1, Q5	001-021070	2N 3391A
2	Q2, Q6	001-021172	2N 4249
1	Q3	001-021260	2N 5826
2	Q4, Q12	001-021135	2N 3394
2	Q7, Q8 MATCHED PAIR	001-021260-001	2N5826 MATCH
2	Q9, Q10	001-021133	2N 3394
1	Q11	001-021132	2N 3394

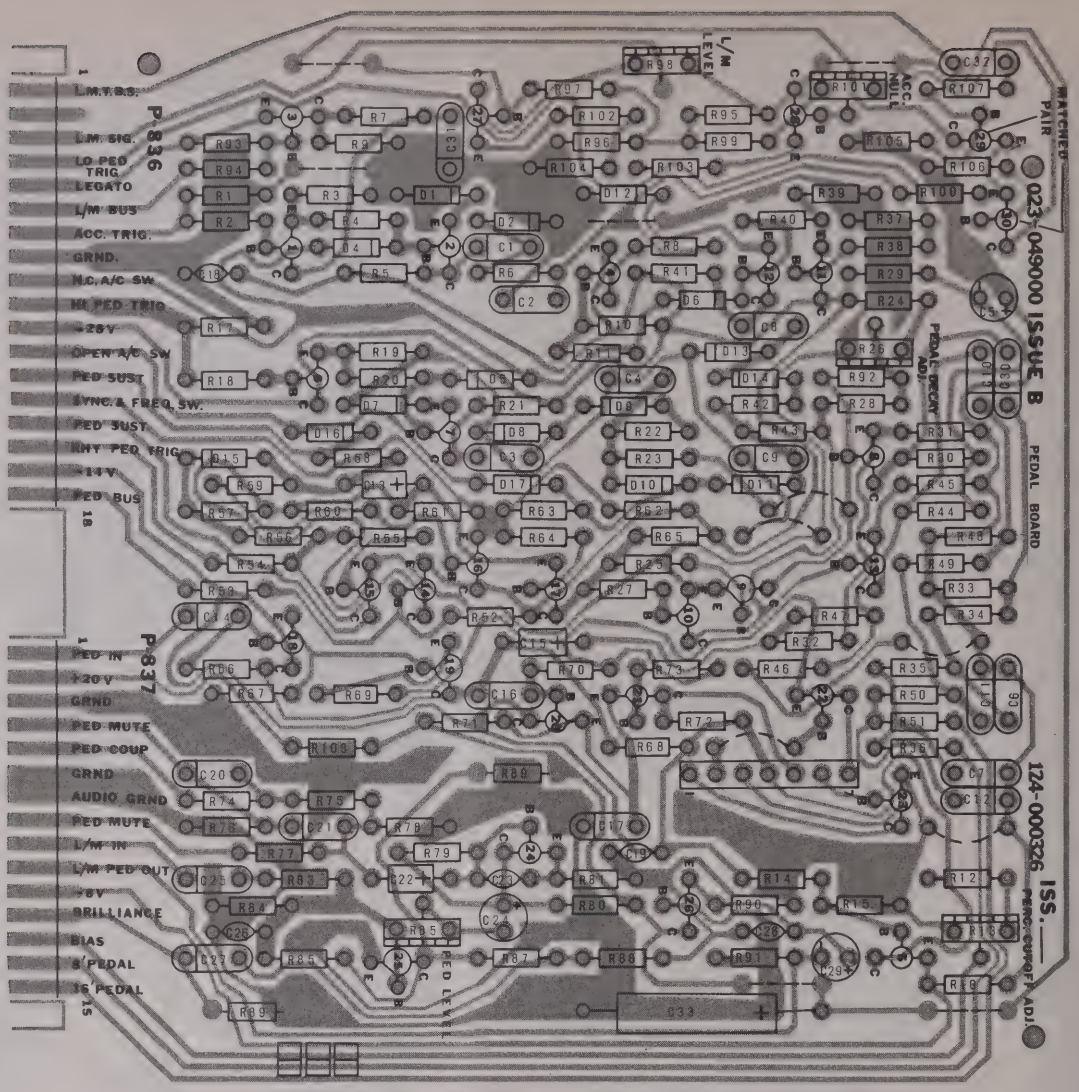
REVISIONS		
A	COLLECTOR & EMITTER LEADS OF Q6 UPDATED.	
B	MATCHED PAIR NOTE ADDED TO Q7 & Q8. R28 WAS 250 K. R31 WAS 390 K. R47 WAS 330K	
C	R17 WAS 100K. R64 WAS 10 K. R65 WAS 3900. Q3, Q7 & Q8 WERE 001-021070.	

124-000208
094-046070-C

15

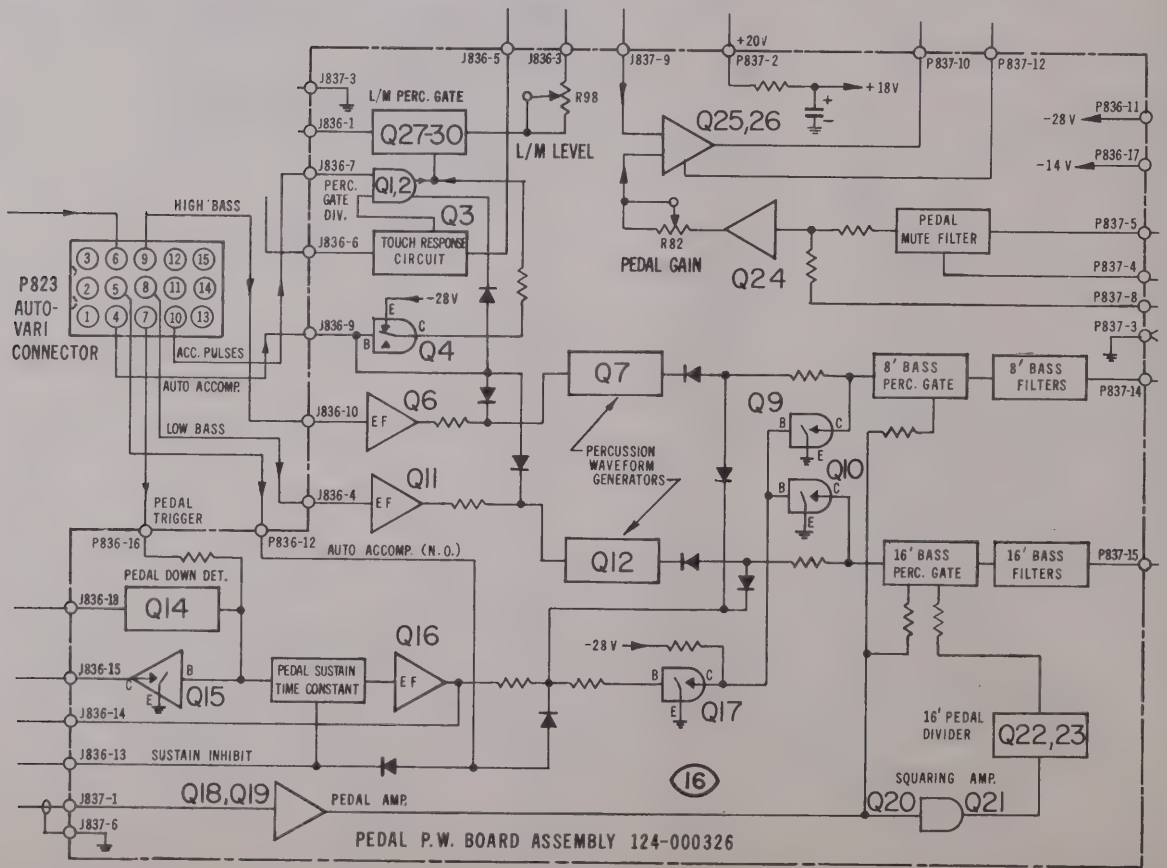
FIGURE 3-22
BRIGHT PERCUSSION FILTER BOARD
SCHEMATIC, LAYOUT AND THEORY
(124-000208)

REVISIONS



NOTES:

1. UNLESS OTHERWISE SPECIFIED: ALL RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±10%; ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. SYMBOL "P836-13" INDICATES CONNECTOR (P836 OR P837) AND ONE OF IT'S PINS (-13); SYMBOL "J7" INDICATES ONE OF SEVEN PINS ON PRINTED DIVIDER NETWORK PDN #1.



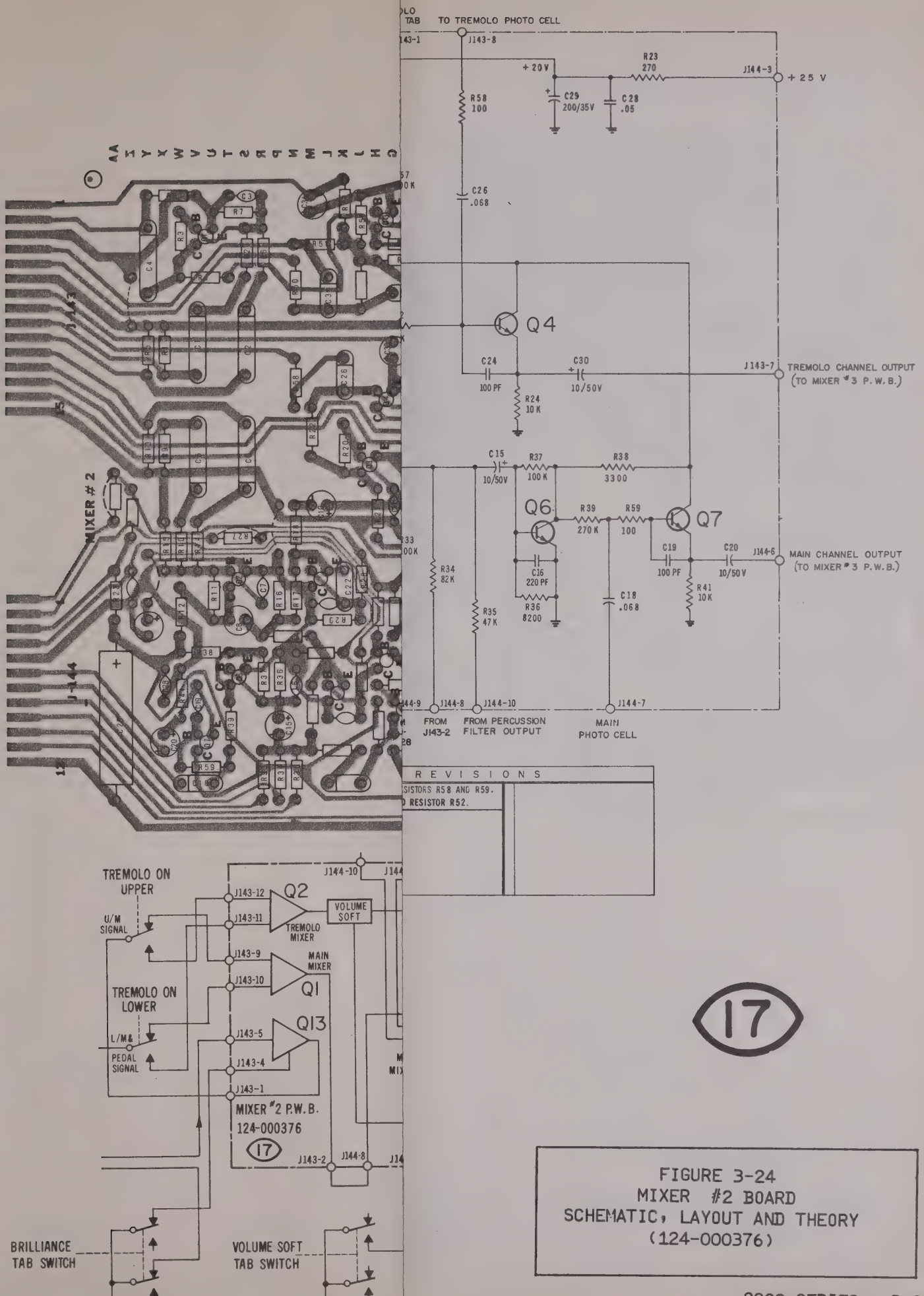


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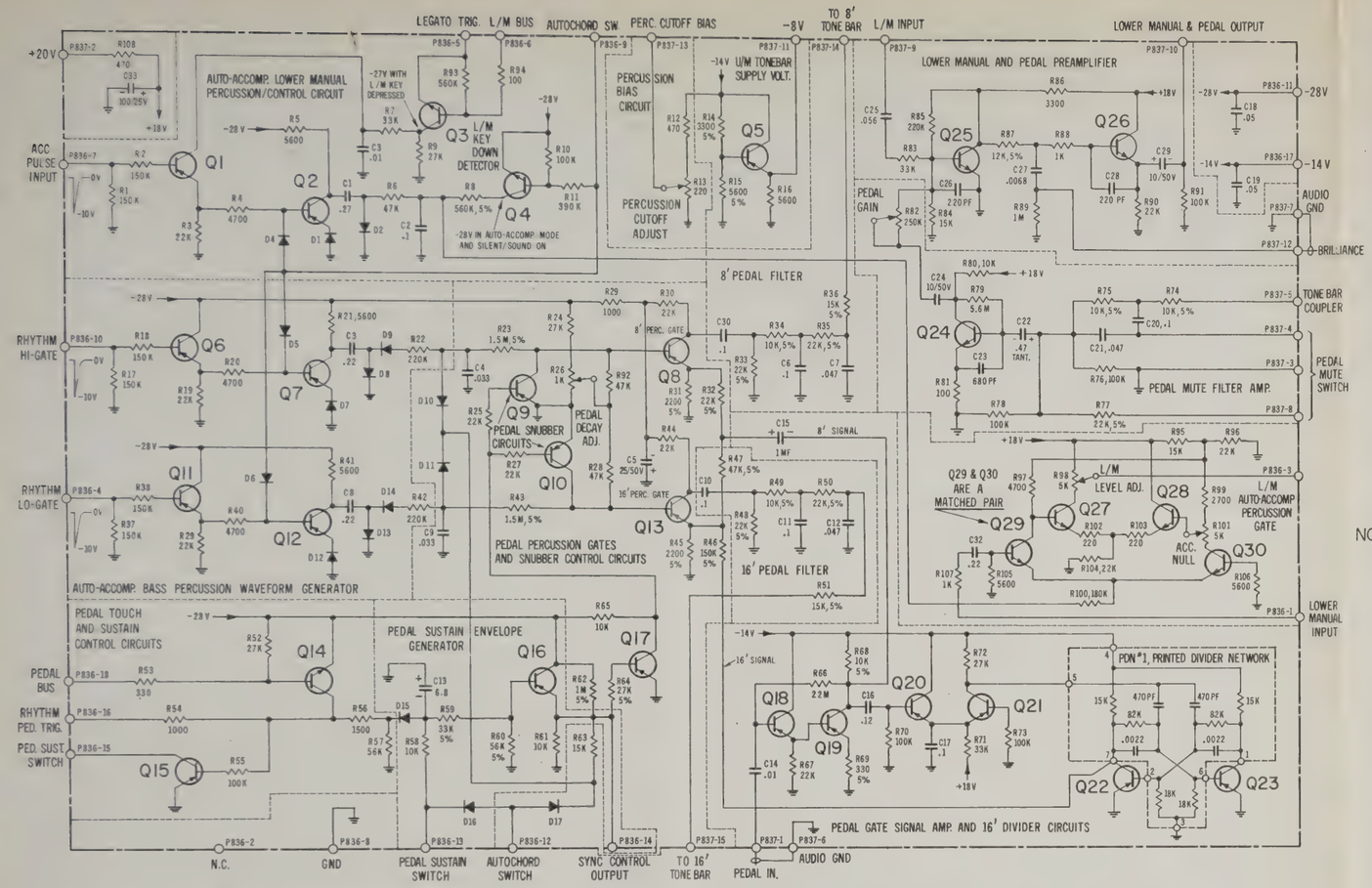
FIGURE 3-24
MIXER #2 BOARD
SCHEMATIC, LAYOUT AND THEORY
(124-000376)



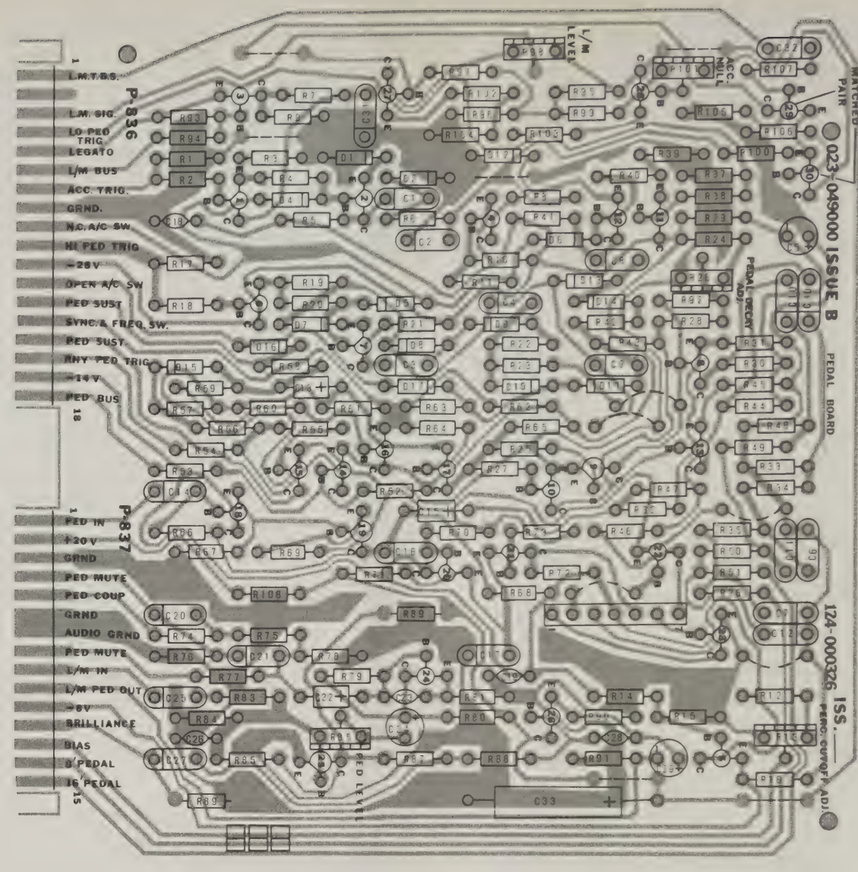
QTY	DESIGNATION SYMBOL	HAMMOND PART NO.	JEDEC PART NO.	OUTLINES
14	Q1,Q2,Q5-Q7,Q9-Q12,Q16-Q17,Q22,Q23	001-021172	2N 4249	
5	Q3,Q4,Q26,Q27,Q28	001-021133	2N 3394	
6	Q8,Q13,Q18,Q19,Q20,Q21	001-021173	2N 4249	
1	Q14	001-021134	2N 3394	
2	Q24,Q25	001-021260	2N 5826	
2	Q29 & Q30, MATCHED PAIR	001-021260-001	2N 5826	
16	D1,D2 & D4 THRU D17	001-026080	1N 4148	
1	PDN*1(PRINTED DIVIDER NETWORK)	058-028540	———	

094-049004-C, SCHEMATIC DIAGRAM OF PEDAL P. W. BOARD 124-000326

REVISIONS

NOTES:

1. UNLESS OTHERWISE SPECIFIED: ALL RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±10%; ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. SYMBOL "P836-19" INDICATES CONNECTOR (P836 OR P837) AND ONE OF IT'S PINS (-13); SYMBOL "3" INDICATES ONE OF SEVEN PINS ON PRINTED DIVIDER NETWORK PDN*1.



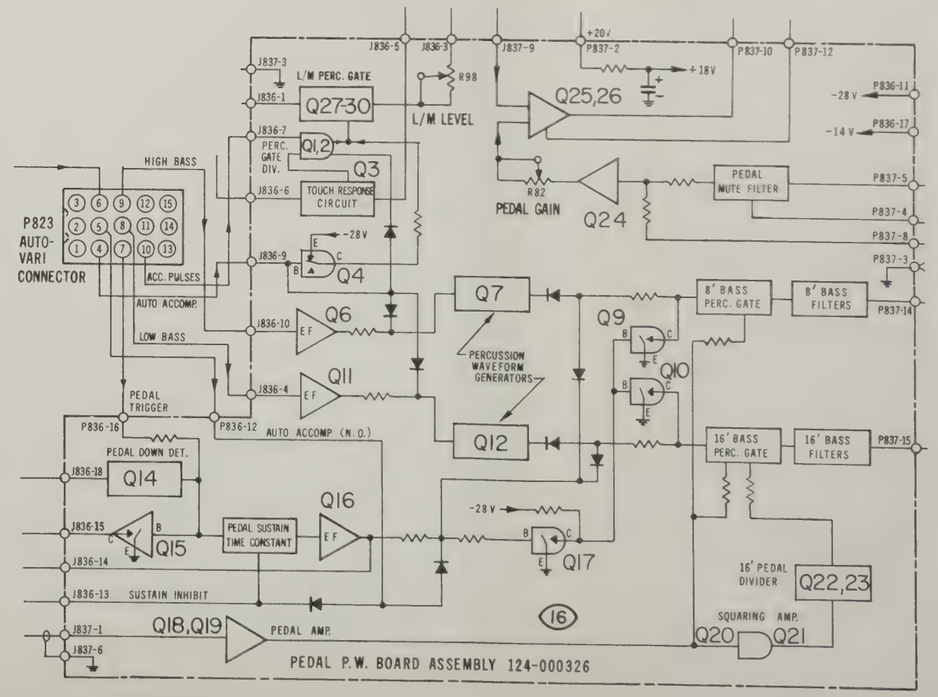
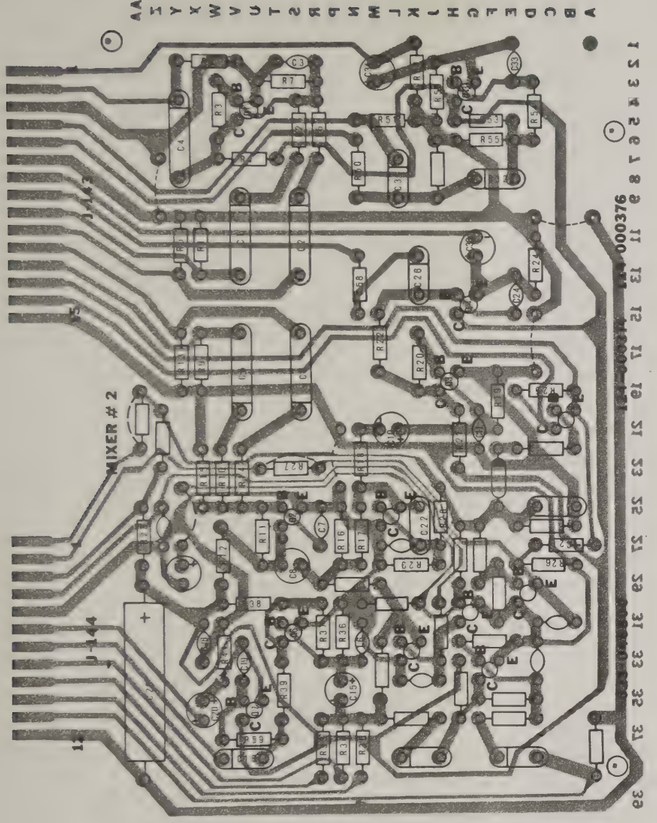
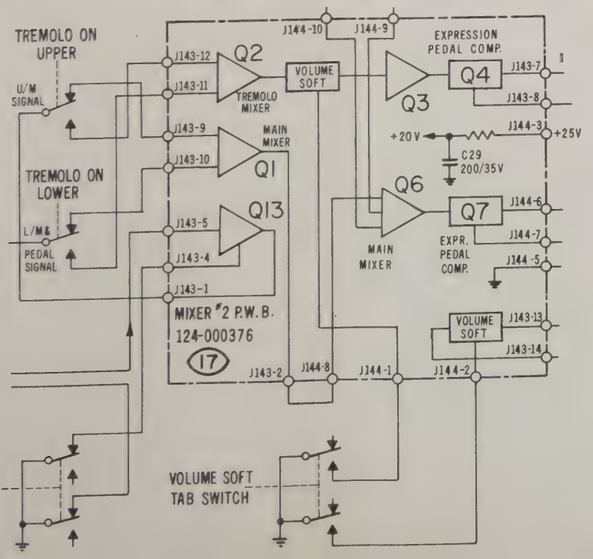
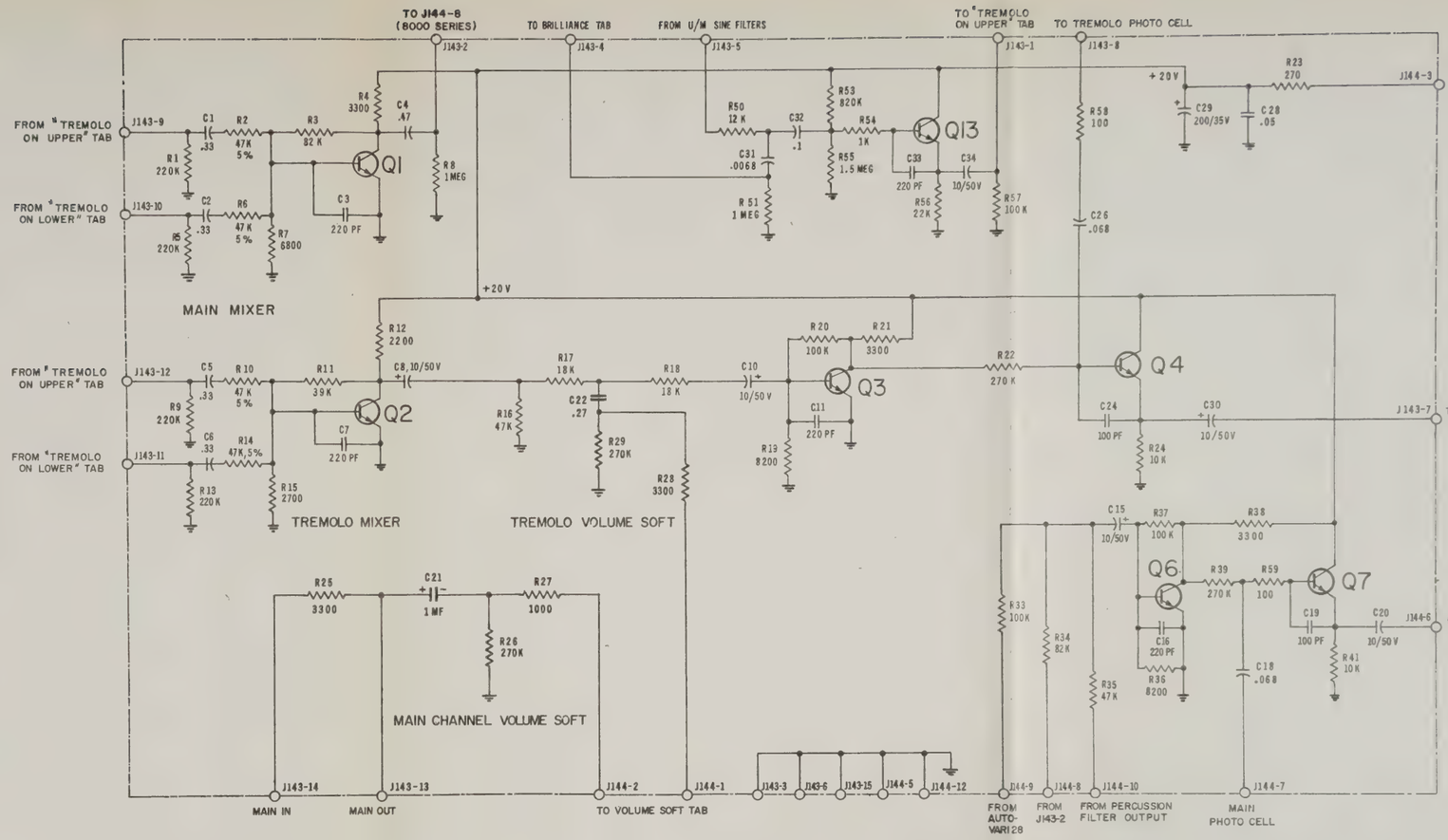


FIGURE 3-23
PEDAL BOARD
SCHEMATIC, LAYOUT
(124-000326)

16







094-050378-A, SCHEMATIC DIAGRAM OF MIXER P. W. BD. # 2, 124-000376

NOTES:

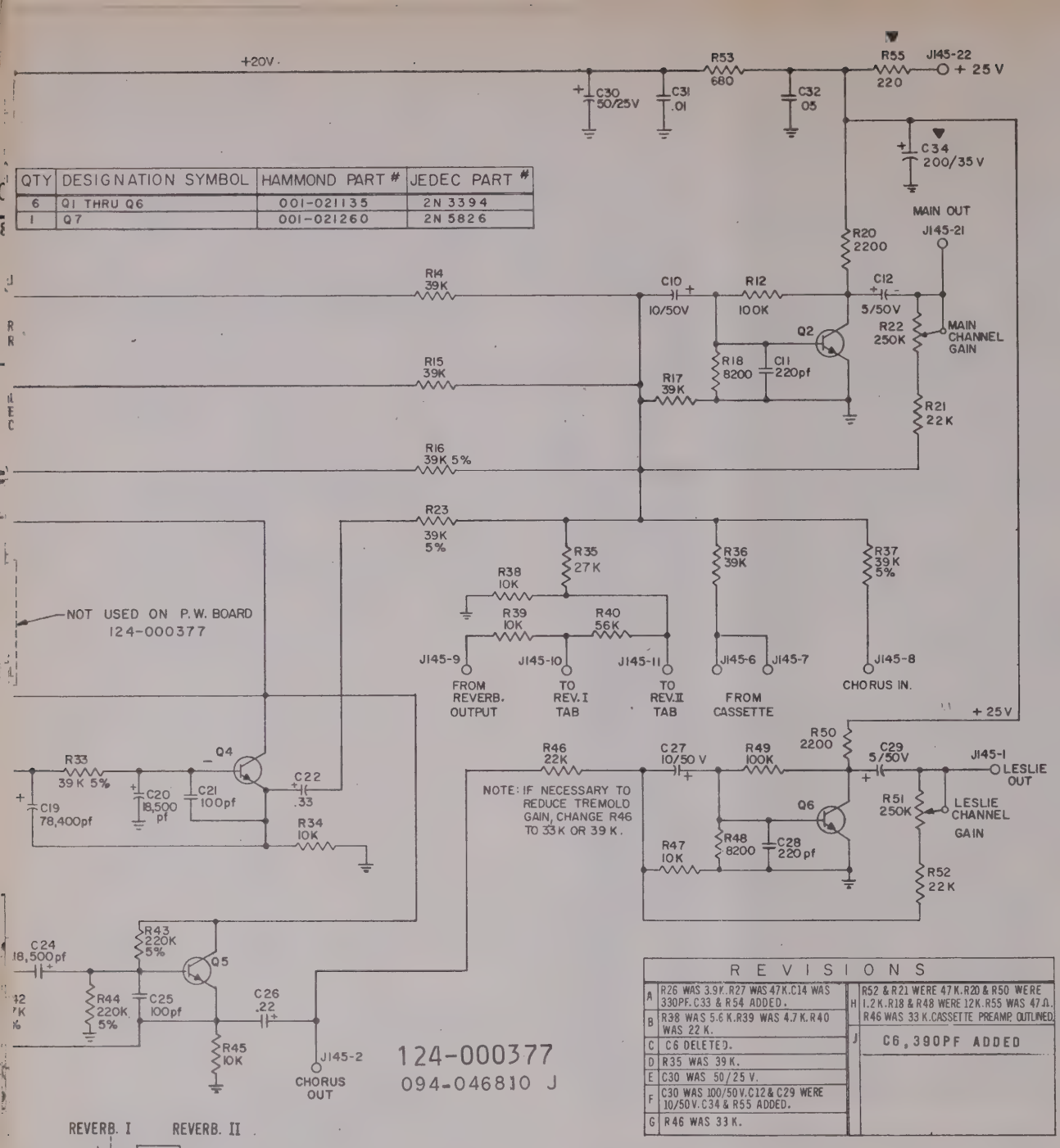
1. IF OTHERWISE NOT SPECIFIED:
   ALL RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±10 %;
   ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. SYMBOL ⏀ INDICATES PIN & IT'S NO. IN ONE OF 2 CONNECTORS.

QTY	DESIGNATION SYMBOL	HAMMOND PART #	JEDEC PART #
7	Q1 THRU Q4, Q6, Q7, Q13	001-021135	2N3394

REVISIONS		
A	ADDED RESISTORS R58 AND R59. DELETED RESISTOR R52.	

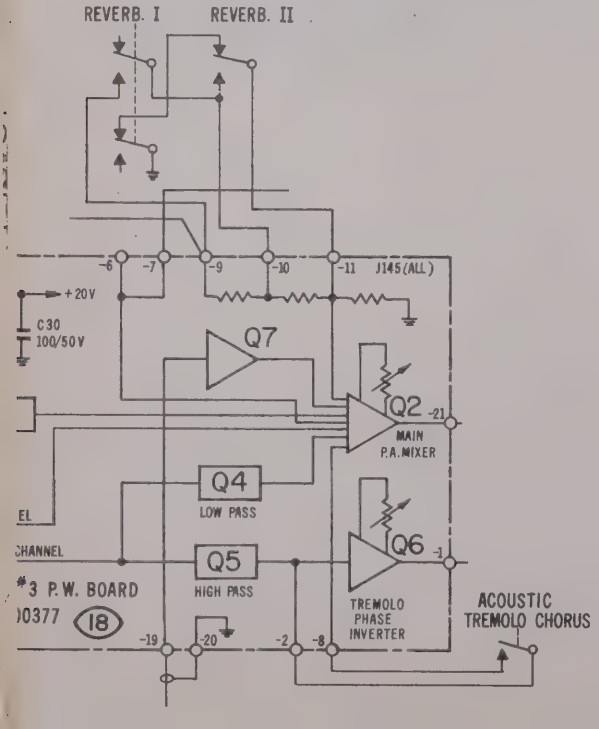
17

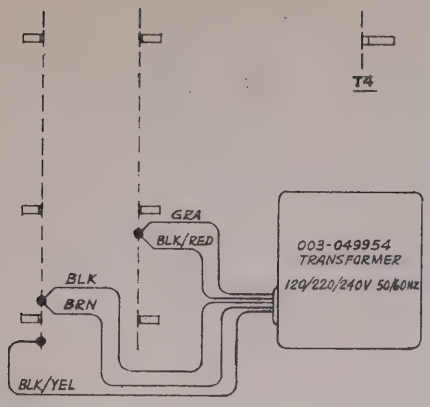
FIGURE 3-24
MIXER #2 BOARD
SCHEMATIC, LAYOUT AND THEORY
(124-000376)



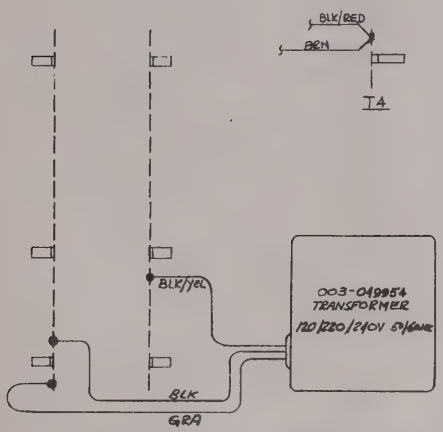
QTY	DESIGNATION SYMBOL	HAMMOND PART #	JEDEC PART #
6	Q1 THRU Q6	001-021135	2N 3394
1	Q7	001-021260	2N 5826

REVISIONS			
A	R26 WAS 3.9K. R27 WAS 47K. C14 WAS 330PF. C33 & R54 ADDED.	H	R52 & R21 WERE 47K. R20 & R50 WERE 1.2K. R18 & R48 WERE 12K. R55 WAS 47Ω. R46 WAS 33 K. CASSETTE PREAMP. OUTLINED.
B	R38 WAS 5.6 K. R39 WAS 4.7 K. R40 WAS 22 K.	J	C6, 390PF ADDED
C	C6 DELETED.		
D	R35 WAS 39 K.		
E	C30 WAS 50/25 V.		
F	C30 WAS 100/50V. C12 & C29 WERE 10/50V. C34 & R55 ADDED.		
G	R46 WAS 33 K.		

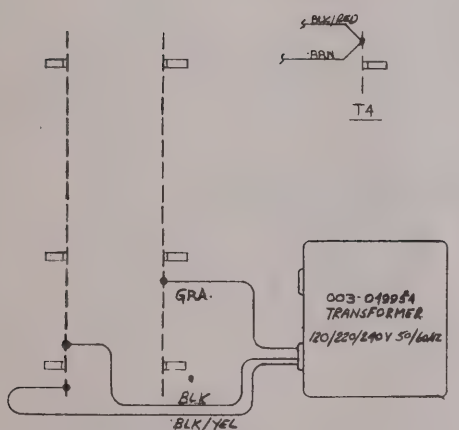




TRANSFORMER PRIMARY CONNECTIONS 126-000119
(120V 50/60)

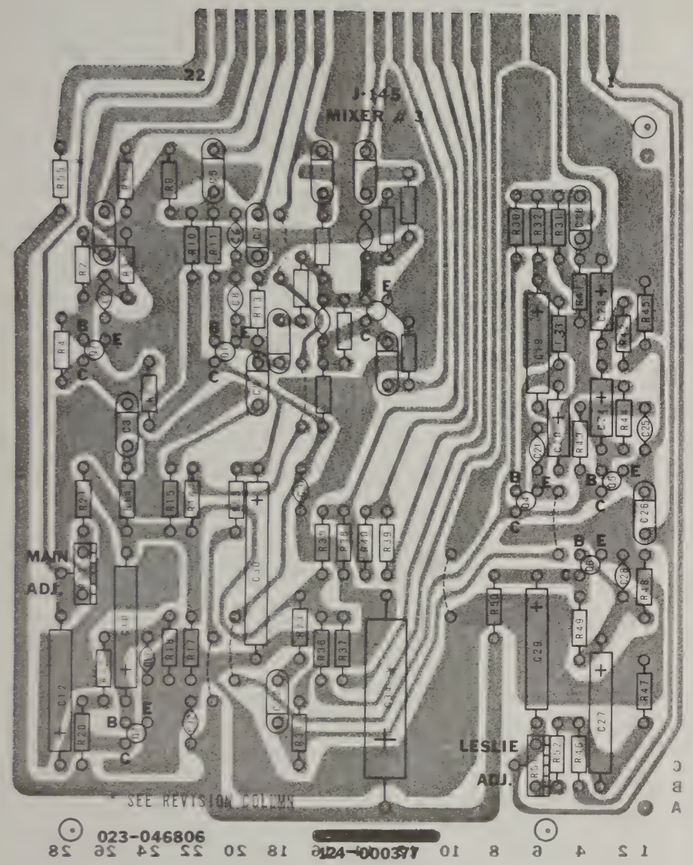


TRANSFORMER PRIMARY CONNECTIONS 126-000118
(220V 50/60HZ)



TRANSFORMER PRIMARY CONNECTIONS 126-000118
(240V-50/60 HZ)

FIGURE 3-26
POWER SUPPLY AND AMPLIFIER
WIRING DIAGRAM



QTY	DESIGNATION SYMBOL	HAMMOND PART #	JEDEC PART #
6	Q1 THRU Q6	001-021135	2N 3394
1	Q7	001-021260	2N 5826

NOTES:

1. IF OTHERWISE NOT SPECIFIED:
   ALL RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±10%;
   ALL CAPACITOR VALUES ARE IN MICROFARADS.

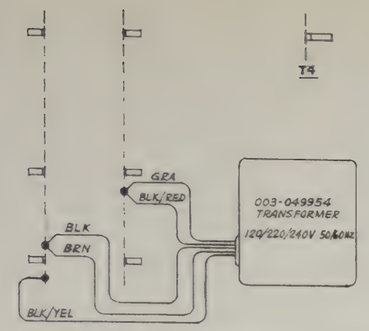
NOT USED ON P.W. BOARD 124-000377

NOTE: IF NECESSARY TO REDUCE TREMOLO GAIN, CHANGE R46 TO 33K OR 39K.

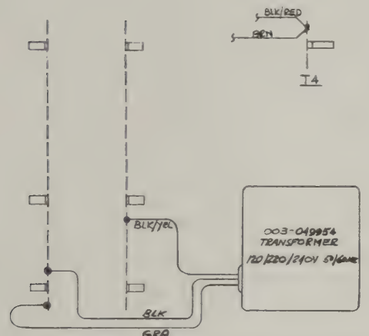
REVISIONS			
A	R26 WAS 3.9K. R27 WAS 47K. C14 WAS 330PF. C33 & R54 ADDED.	H	R52 & R21 WERE 47K. R20 & R50 WERE 1.2K. R18 & R48 WERE 12K. R55 WAS 47 Ω. R46 WAS 33 K. CASSETTE PREAMP OUTLINED.
B	R38 WAS 5.6 K. R39 WAS 4.7 K. R40 WAS 22 K.	J	C6, 390PF ADDED
C	C6 DELETED.		
D	R35 WAS 39 K.		
E	C30 WAS 50/25 V.		
F	C30 WAS 100/50 V. C12 & C29 WERE 10/50 V. C34 & R55 ADDED.		
G	R46 WAS 33 K.		

124-000377
094-046810 J

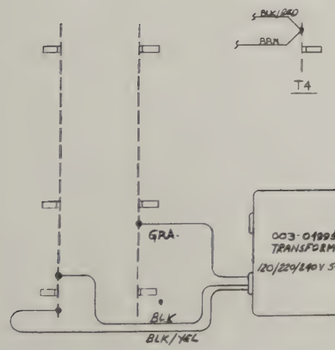
FIGURE 3-25
MIXER BOARD #3
SCHEMATIC, LAYOUT AND THEORY
(124-000377)



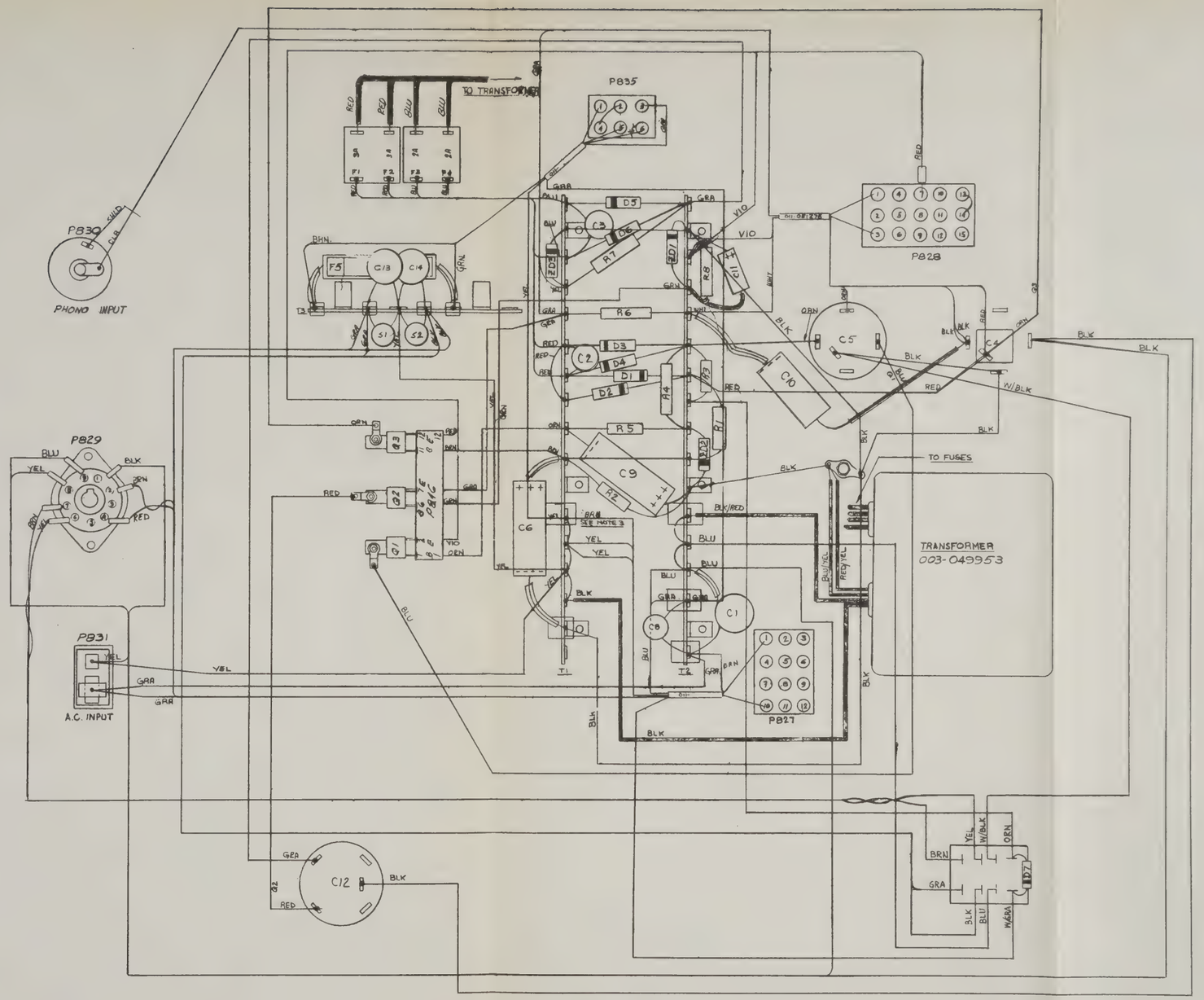
TRANSFORMER PRIMARY CONNECTIONS 126-000119
(120V 50/60)



TRANSFORMER PRIMARY CONNECTIONS 126-000118
(220V 50/60HZ)



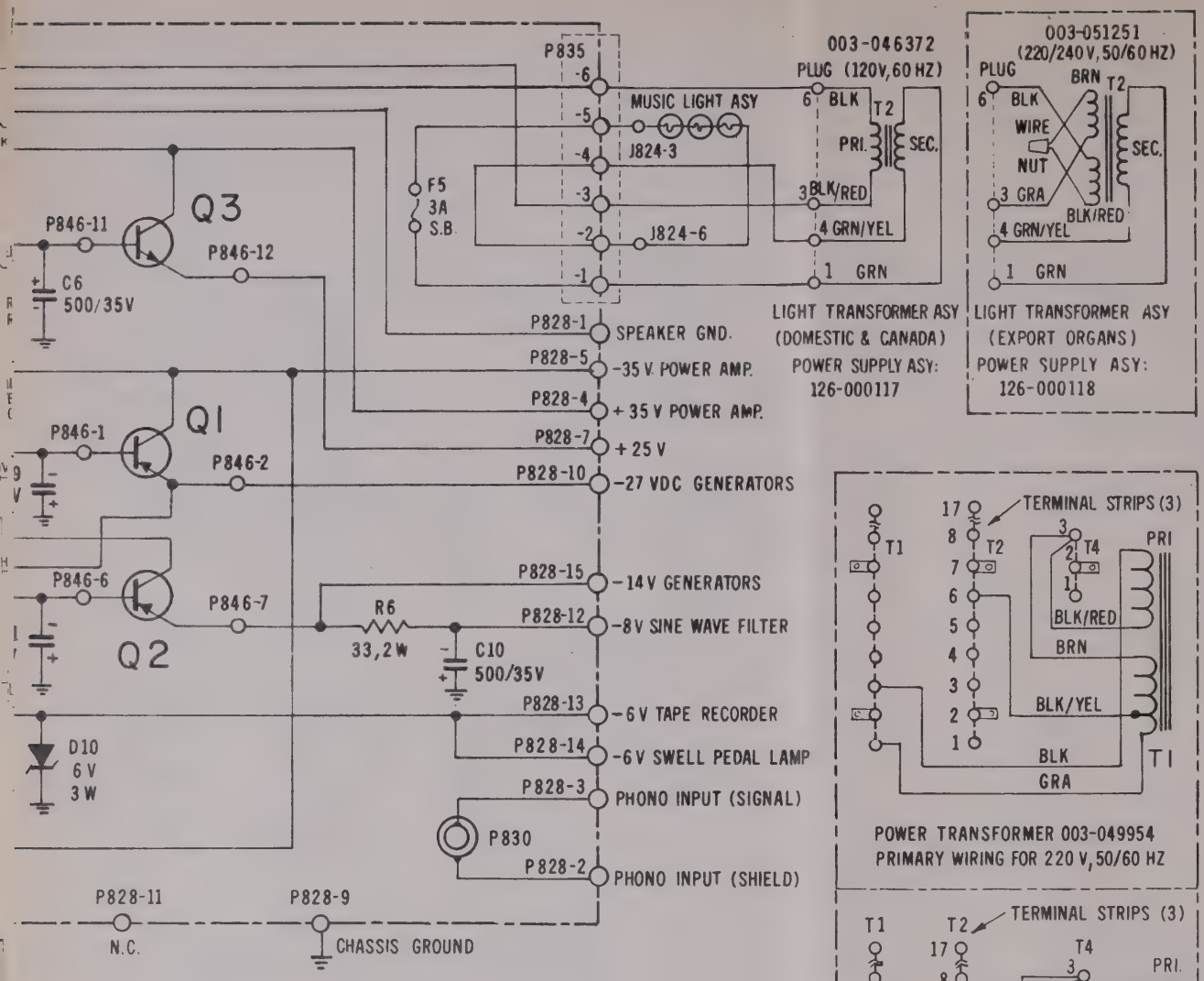
TRANSFORMER PRIMARY CONNECTIONS 126-000118
(240V-50/60 HZ)



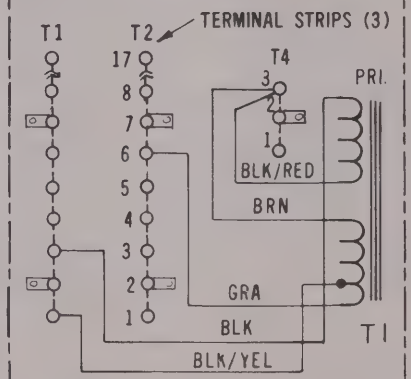
NOTES:

1. 126-000117 WIRED AS SHOWN
2. POWER TRANSFORMER PRIMARY LEAD LOCATIONS ON 126-000118 DIFFER FROM 126-000117 SEE DETAIL VIEWS FOR CORRECT WIRING.
3. FOR 126-000118 CONNECT BRN WIRE FROM P827-3 TO T4 AS ILLUSTRATED (SEE FIGURE 3-28 FOR SHEMATIC).

FIGURE 3-26
POWER SUPPLY AND AMPLIFIER
WIRING DIAGRAM



POWER TRANSFORMER 003-049954
PRIMARY WIRING FOR 220 V, 50/60 HZ



POWER TRANSFORMER 003-049954
PRIMARY WIRING FOR 240 V, 50/60 HZ

POWER SUPPLY 126-000118
(EXPORT ORGANS)

#	REVISIONS

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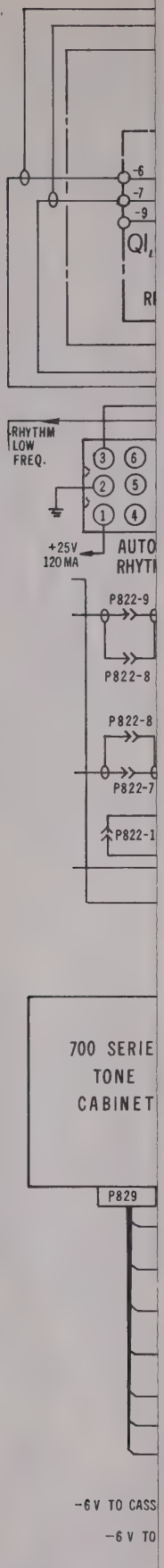
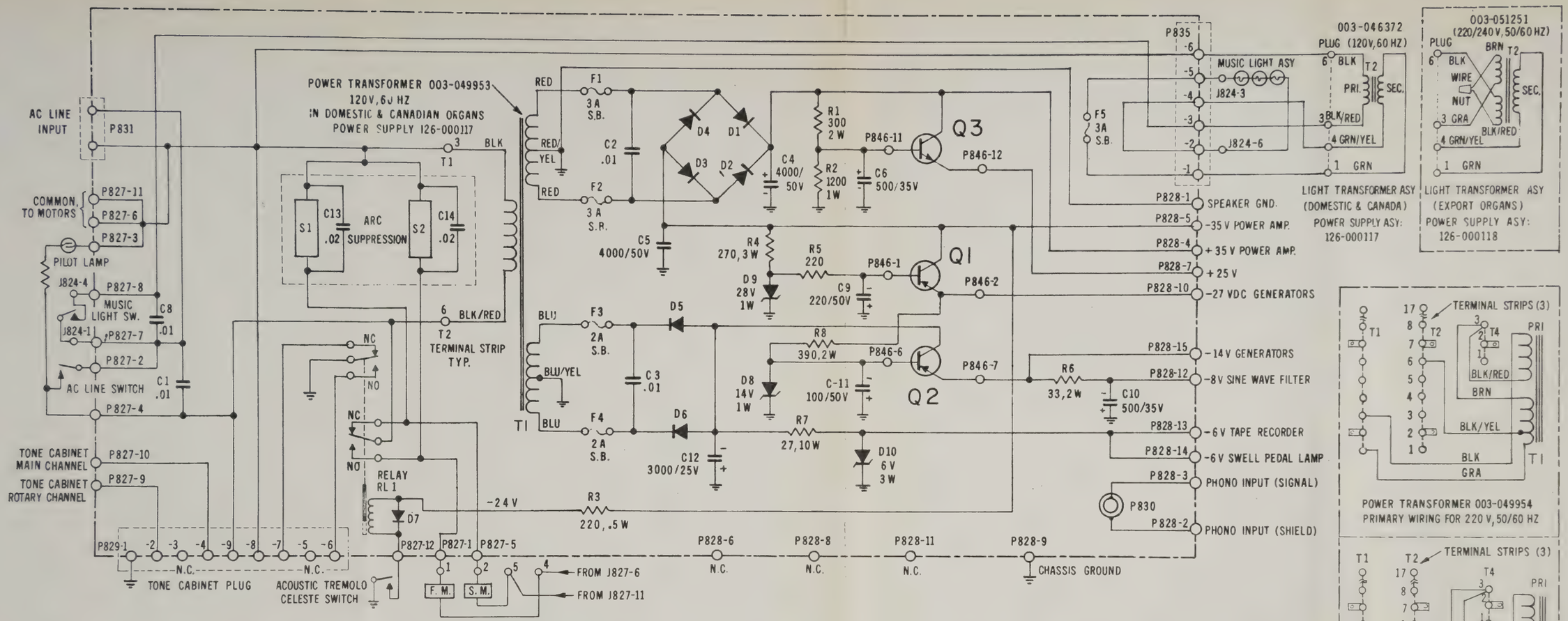


FIGURE 3-28
AMPLIFIER AND ASSOCIATED
ASSEMBLIES - LOGIC DIAGRAM



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±10% TOL;
   ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. SYMBOL ○— INDICATES PIN & IT'S NO. IN PLUG OR CONNECTOR.
3. UNLESS OTHERWISE SHOWN, ALL SWITCHES ARE IN "OFF" POSITION.
4. POWER SUPPLY ASY 126-000117 (DOMESTIC & CANADA) AS SHOWN. FOR POWER SUPPLY ASY 126-000118 (EXPORT) SEE POWER AND LIGHT TRANSFORMER PRIMARY WIRINGS, SHOWN AT RIGHT- IN DOTTED RECTANGLES.

QTY	DESIGNATION SYMBOL	HAMMOND PART #	JEDEC PART #
2	Q1,Q2	001-022082	2N 6107
1	Q3	001-021322	2N 5298
6	D1 THRU D6	001-024061	1N 4720
1	D7	001-024052	1N 3189
1	D8 (ZENER, 14V, 1W)	001-023026	1N 4744
1	D9 (ZENER, 28V, 1W)	001-023027	1N 4750
1	D10 (ZENER, 6V, 3 W)	001-023043	1N 5340A

094-051286-A, SCHEMATIC DIAGRAM OF POWER SUPPLY 126-000117 & 126-000118
(FOR SPINET-8200 USAGE)

REVISIONS		

FIGURE 3-27
POWER SUPPLY & AMPLIFIER ASSEMBLY - SCHEMATIC (126-000117 & 118)

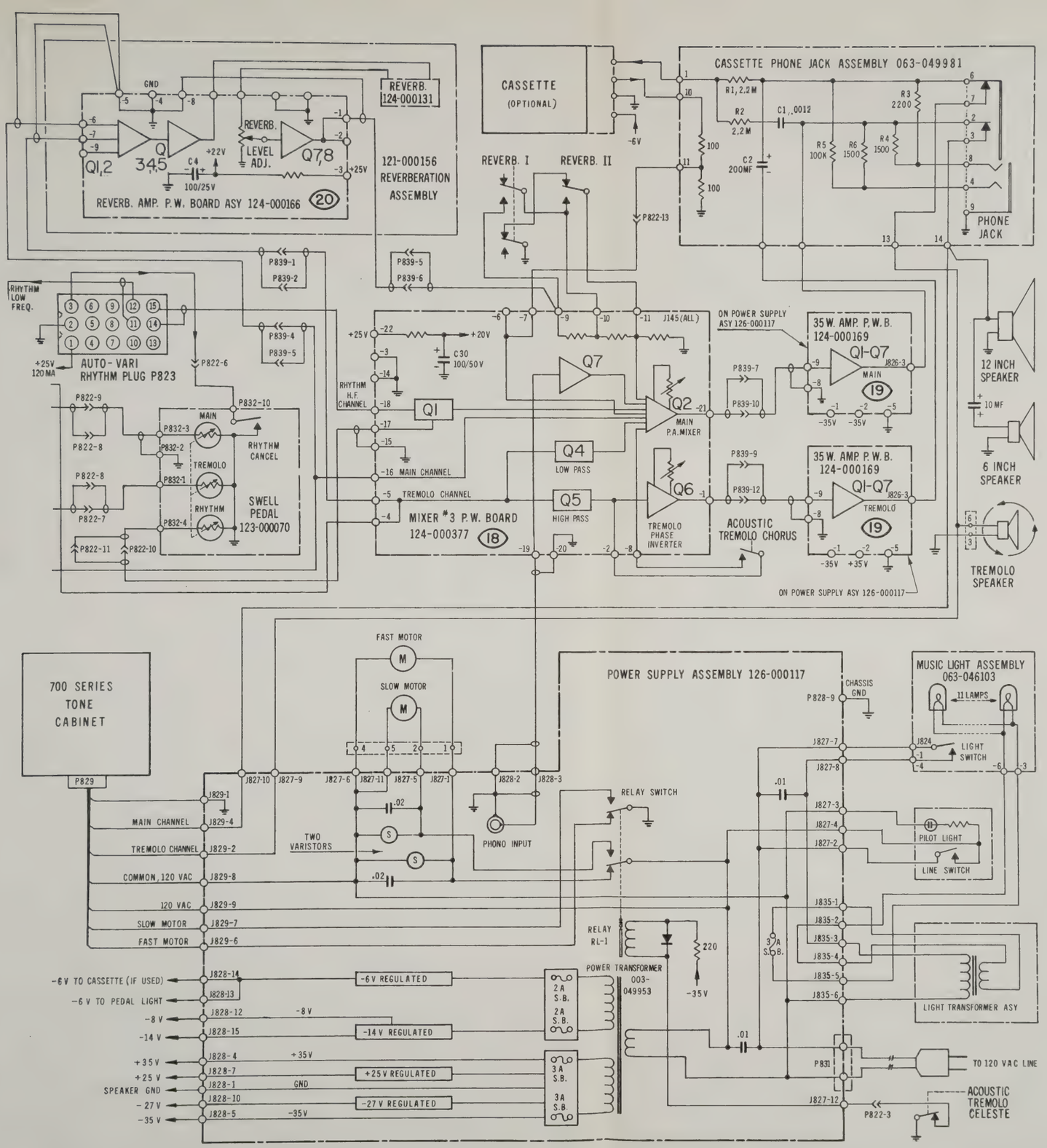
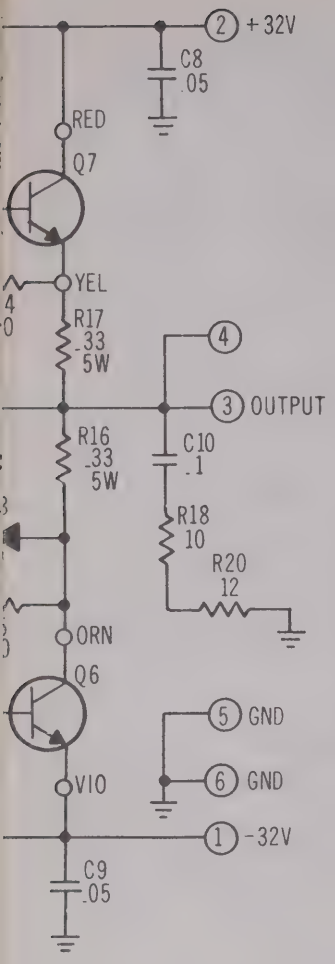
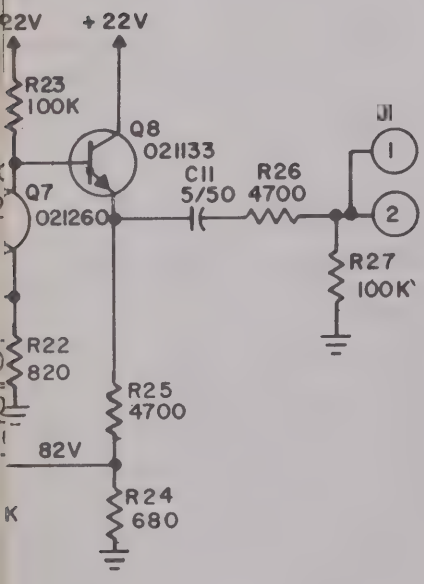


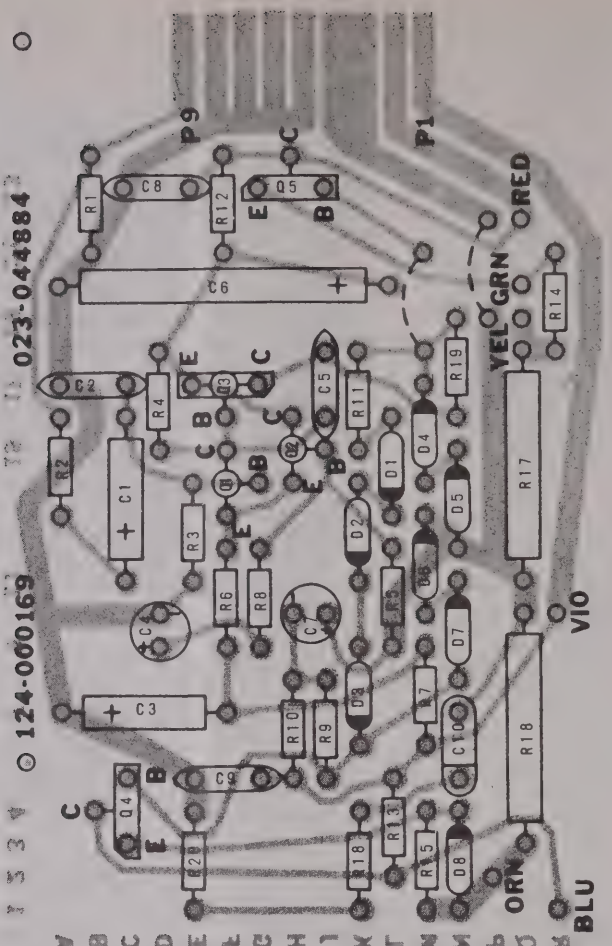
FIGURE 3-28
AMPLIFIER AND ASSOCIATED
ASSEMBLIES - LOGIC DIAGRAM

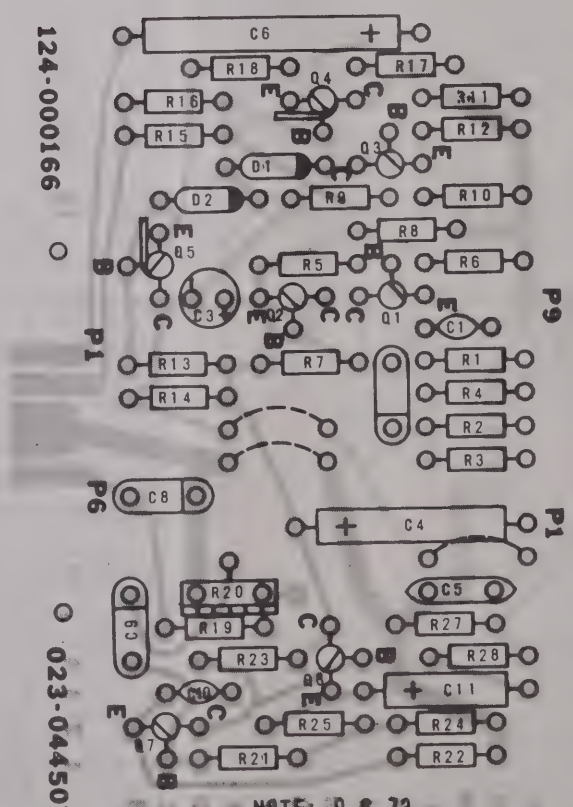




094-044526 C

4 WAS 390Ω
4 WAS 1500





NOTE: 9-6-73
C-4 WAS RELOCATED

1) **GENERAL.**--This section contains the f either 3/4 time rhythm button is depressed, the the Auto Vari Rhythm Units. There a Q11 will be disconnected and Q11 will be connected The Accessory Model, which is a sel ivider output. The Y1 divider output will cause its own power source, but does requi s note to sound at the beginning of measure 1 and speaker. This unit does not con h bass note to sound at the beginning of measure iment feature or the play along voic h bass, low bass, and accompaniment organ sig- features should be excluded when usi unted to ground through diodes D13, D4, D5 and Accessory Model. e Auto-Accompaniment switch is "off".

The In-Built Version, which is assem Q13 and Q14 form an astable multi-vibrator with the complete organ. The Rhythm Unit of approximately 20 HZ. This astable is turned identical in the organ models it is the Rhythm I.C. supplies a +14 volt drum roll el and mountings will differ due to I.C. pin #38. The output of the astable is amp- or. The In-Built does contain the A ransistor Q15 which supplies a low impedance play along voices. signal to the snare drum output through diode D9.

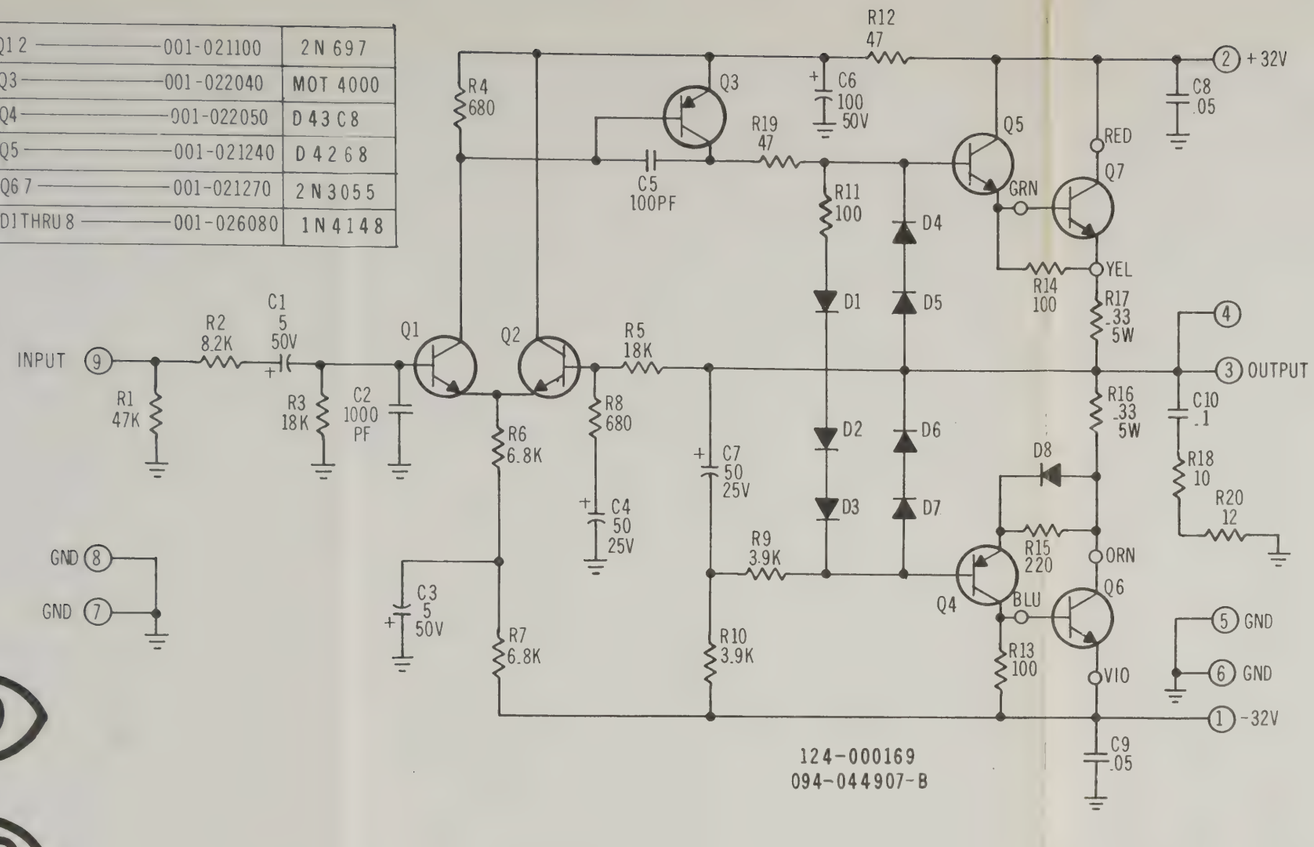
The Auto Vari has sixteen Rhythm pat e outputs (J2-3 through J2-12) are connected 16 interlocking push buttons which c the I.C. voice output pins. These outputs pro- ularly or in combinations. Two of t pedance (2,000-ohm) positive-going drive pulses time Rhythm patterns, and other four red directly to the voicing circuits on the 4/4 time Rhythm patterns. oicing board.

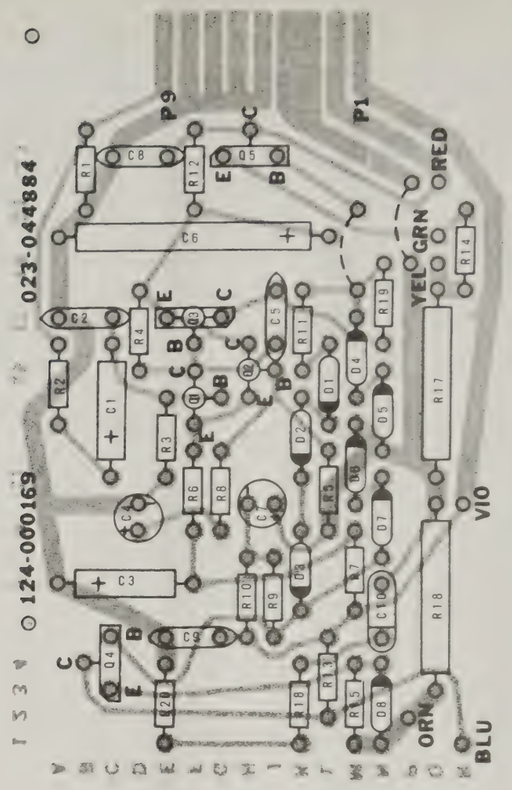
2) **PATTERN GENERATOR BOARD - 124-000379** **)ARD - 124-000418**--The Variation Board provides contains the 075-000430 custom Rhyth g circuits: ally the heart of the Auto Vari 64. ascaded dividers which provide the "8" and "16" mable pattern memory, sixteen D.C. c e signals for the Autovari measures switch. puts, twelve outputs for eleven voic r-station lighted pushbutton switch assembly paniment signal. There is a separat associated I.C. divider, decoding circuits and disable the eleven voice outputs. T ion switch lamp amplifiers. this Rhythm unit. There is a clock stor lamp amplifier for Tempo, Measure I and drive the internal decoding circuits e II. quency varies from 4.8 HZ to 30 HZ a address decoder. The five counter s D" divider package (I.C. 2) is used to provide address decoder are designated X1 th "16" measure signals for the automatic varia- X4 and X5 outputs brought out of the The first divider input, Z1-Pin 12, is connected divider Y1 which in turn drives the the Z1 output of the Pattern Generator Board. Y1 feeds Divider Z1 which provides o vider output (Z2) is one half the frequency of outputs for driving the variation de d Z3 is one fourth the frequency of the input. the two 3/4 time patterns is activat are +14 volts square waves which are wired dir- automatically changes the address de "8" and "16" positions of the measures switch. measure to an 18 count measure. The put (Pin 13) receives a +14 volt reset pulse control inputs which are fed by divi e rhythm unit starts sounding. variation board (123-000418). The " these inputs into one of four possib f the measures switch is connected through a .01 tempo of the Rhythm Unit is controll or to the Autovari switch. When the Autovari tiometer located on the front panel on", this signal is connected through the varia- tempo control is connected to J1-13 nput (Pin 6) to R16, D1, R17 and pin 3 of I.C. 1. of charging current for capacitor C1 ents are used to differentiate the various clock C1 will increase until it is greater s and drive the two cascaded dividers (I.C. 1). junction of R5 and R6. Transistor Q outputs, which are designated y^2 (first stage) and junction transistor, will then turn tage), are used to drive the variation decoding resistor R4. This discharge current de the 075-000430 rhythm I.C. and the "2 input and" tor Q17, which is used to amplify th ch drive the four variation lamps. The "and" +14 volt signal required to drive th variation A is comprised of D10, D11, R29 and Q8. Rhythm I.C. nd D13 are used to bias the emitters of Q5-Q8 ately +1.6 volts. This bias is needed because

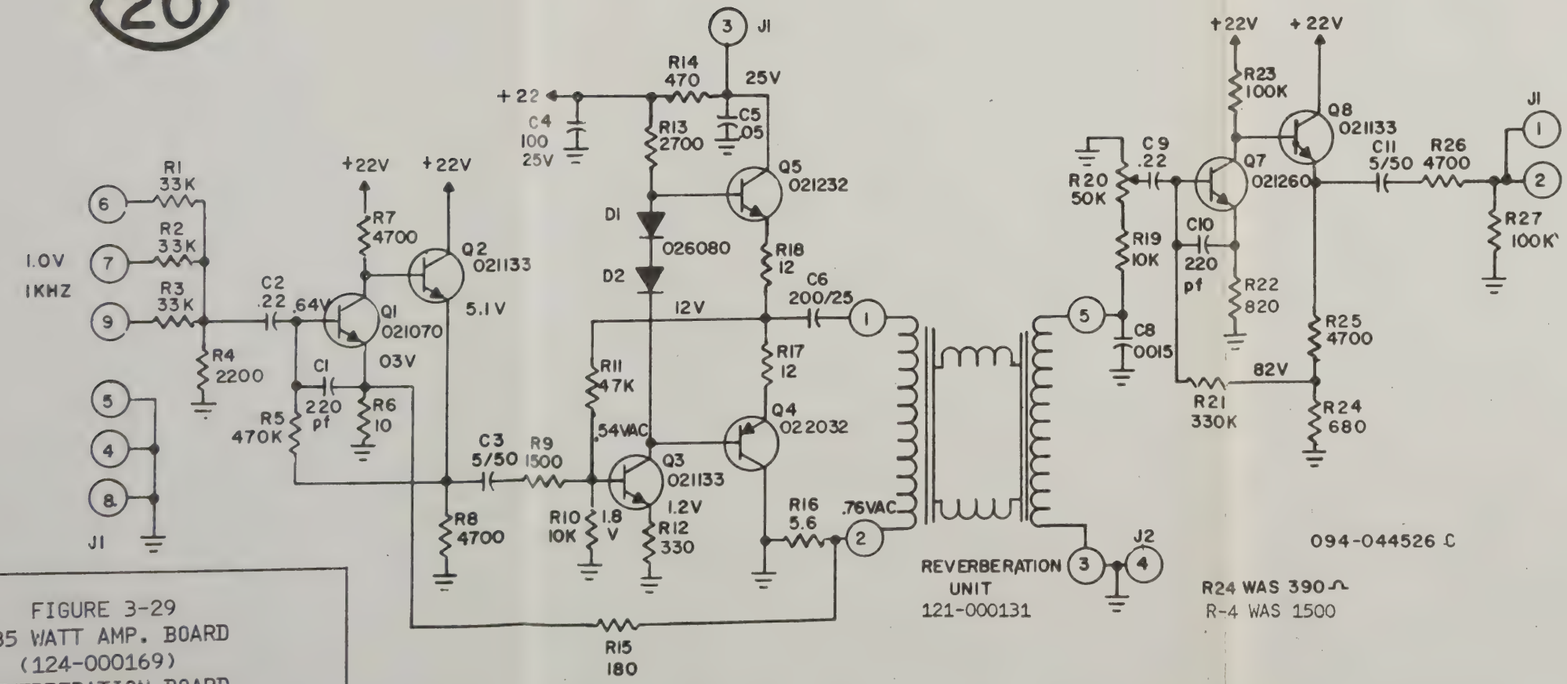
Transistors Q2 and Q3 from a "Set-Re e high "0" level at the output of the I.C. and starts the Rhythm Generator. Th Y3 are both at a "1" level, D10 and D11 will biased and R29 will supply base current to Q8 which

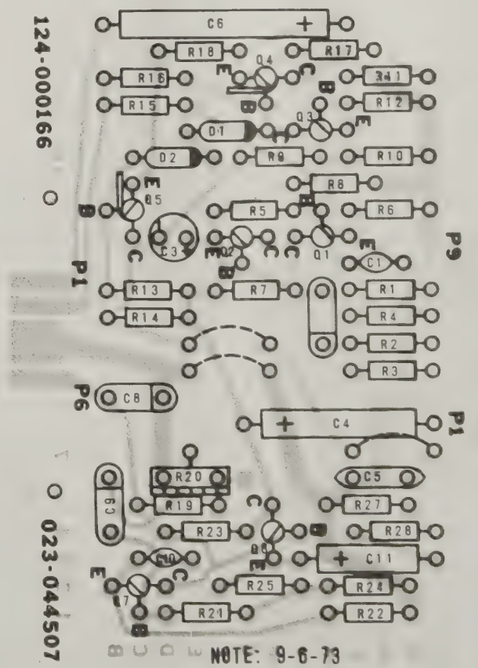
FIGURE 3-30
AUTO VARI - 64 RHYTHM
THEORY OF OPERATION
(SHEET 1 OF 2)

Q1 2	001-021100	2N697
Q3	001-022040	MOT 4000
Q4	001-022050	D43C8
Q5	001-021240	D4268
Q6 7	001-021270	2N3055
D1 THRU 8	001-026080	1N4148









NOTE: 9-6-73
C-4 WAS RELOCATED

FIGURE 3-29
35 WATT AMP. BOARD
(124-000169)
REVERBERATION BOARD
(124-000166)

REVERBERATION BOARD 124-000166

AUTO VARI-64 THEORY OF OPERATION (SHEET 1 OF 2)

1) **GENERAL.**--This section contains the theory of operation, of the Auto Vari Rhythm Units. There are basically two models. The Accessory Model, which is a self contained unit with its own power source, but does require an external amplifier and speaker. This unit does not contain the Auto-Accompaniment feature or the play along voices. Reference to these features should be excluded when using this text for the Accessory Model.

The In-Built Version, which is assembled into and part of the complete organ. The Rhythm Units and functions are identical in the organ models it is used. The control panel and mountings will differ due to cabinet styling and color. The In-Built does contain the Auto-Accompaniment and play along voices.

The Auto Vari has sixteen Rhythm patterns, controlled by 16 interlocking push buttons which can be depressed singularly or in combinations. Two of the buttons select 3/4 time Rhythm patterns, and other fourteen buttons select 4/4 time Rhythm patterns.

2) **PATTERN GENERATOR BOARD - 124-000379**--The 124-000379 Board contains the 075-000430 custom Rhythm IC which is basically the heart of the Auto Vari 64. This IC has a programmable pattern memory, sixteen D.C. controlled pattern inputs, twelve outputs for eleven voices and one Auto-Accompaniment signal. There is a separate gate input which will disable the eleven voice outputs. This gate is not used in this Rhythm unit. There is a clock input which is used to drive the internal decoding circuits. The clock input frequency varies from 4.8 HZ to 30 HZ and drives the 24/18 count address decoder. The five counter stages which make up the address decoder are designated X1 through X5, with only X3, X4 and X5 outputs brought out of the I.C. Divider X5 drives divider Y1 which in turn drives the measure decoder. Divider Y1 feeds Divider Z1 which provides one of switch selectable outputs for driving the variation decoder. When either of the two 3/4 time patterns is activated, the decoding logic automatically changes the address decoder from a 24 count measure to an 18 count measure. There are two variation control inputs which are fed by dividers Y2 and Y3 on the variation board (123-000418). The "430" Rhythm I.C. decodes these inputs into one of four possible variations. The tempo of the Rhythm Unit is controlled by a 500 K potentiometer located on the front panel of the Rhythm Unit. The tempo control is connected to J1-13 and controls the amount of charging current for capacitor C1. The voltage across C1 will increase until it is greater than the voltage at the junction of R5 and R6. Transistor Q1, and programmable unijunction transistor, will then turn on and discharge C1 through resistor R4. This discharge current will turn on transistor Q17, which is used to amplify the output of Q1 for the +14 volt signal required to drive the clock input of the "430" Rhythm I.C.

Transistors Q2 and Q3 from a "Set-Reset" Flip-Flop which stops and starts the Rhythm Generator. The inputs at J1-1 and 2 are "start" inputs and J1-3 is a "stop" input. With either the Silent/Sound rocker or an input from the lower manual or pedal during "Touch-Start Mode", transistor Q2 will turn on and Q3 will turn off. With Q3 off, a +12 volt signal is applied through R17 and R18 to turn of transistor Q4. This "on" signal can be interrupted by the Foot Switch through J1-7 and diode D1 without changing the state of Q2 or Q3. When Q4 turns on, a "Ground" signal is applied to a common bus connecting all normally open rhythm pattern switches together. Therefore, with a rhythm switch depressed, a "ground" signal will be applied to one of the I.C. pattern inputs and "enable" the rhythm generator. Transistor Q3 also couples a positive signal through C2, R21 and Q6. Transistor Q6 turns "on" and provides a reset pulse to pin 20 of the rhythm I.C. This reset pulse is inverted by transistor Q5 and used to reset the Y2-Y3 dividers and the variation dividers Z2-Z3 on the variation dividers board (124-000418). The reset pulse from Q6 is also coupled through C3, R38 and D6 and (during Auto-Accompaniment Mode only) for the first low bass note each time the rhythm was started.

Transistors Q7 through Q10 provide the "ground" signals for the automatic switching of the organ from Auto-Accompaniment mode to "organ" mode when the Auto-Accompaniment switch is on.

Transistor Q9 is normally supplied a +14 volt signal through R25, R26 and R30. Transistor Q9 provides the low impedance necessary to turn on Q10 through the current limiting resistor R31. Transistor Q10 will "ground" all negative signals applied to J1-10 from the organ. When the Foot Switch (located on the organ swell pedal) is activated, a ground is applied to J1-7 and connected to the junction of R26, R30 and Diode D1. This "ground" removes the +14 volt signal normally applied to Q9, thereby turning off transistor Q9 and Q10. Transistor Q7 will now turn on and supply current through R28 to Q8. Transistor Q8 will now "ground" all negative signals applied to J1-11. Transistors Q8 and Q10 can "sink" up to 8ma. from a negative voltage source.

Transistor Q16 is a pulse inverter for the automatic accompaniment signals. Capacitor C11 and resistor R69 form the differentiation network for the negative accompaniment output pulses. Diode D13 shunts the negative accompaniment signal to ground through J1-15 and the Auto-Accompaniment switch when Auto-Accompaniment is off.

The high and low bass output signals are formed by transistors Q12 and Q11 respectively. The input to transistor Q11 is the X5 square wave output from the "430" I.C. This output is routed through the normally closed contacts of the Waltz and 6/8 March rhythm pattern switches to the base of Q11. The output of Q11 is differentiated by C4 and R36, with the negative pulse passing through D3 (with Auto-Accompaniment on) to the low bass output. The frequency of X5 is one cycle per measure, thereby causing Q11 to generate a negative pulse at the beginning of each measure. Transistor Q12 inverts the output of Q11 and generates a negative pulse (through C5, R41, R42 and D10) during the middle of each measure. If either 3/4 time rhythm button is depressed, the X5 input to Q11 will be disconnected and Q11 will be connected to the Y1 divider output. The Y1 divider output will cause the low bass note to sound at the beginning of measure 1 and the high bass note to sound at the beginning of measure 2. The high bass, low bass, and accompaniment organ signals are shunted to ground through diodes D13, D4, D5 and D11 when the Auto-Accompaniment switch is "off".

Transistors Q13 and Q14 form an astable multi-vibrator with a frequency of approximately 20 HZ. This astable is turned on whenever the Rhythm I.C. supplies a +14 volt drum roll signal from I.C. pin #38. The output of the astable is amplified by transistor Q15 which supplies a low impedance (2,200-ohm) signal to the snare drum output through diode D9.

The ten voice outputs (J2-3 through J2-12) are connected directly to the I.C. voice output pins. These outputs provide low impedance (2,000-ohm) positive-going drive pulses which are wired directly to the voicing circuits on the 124-000380 voicing board.

3) **VARIATION BOARD - 124-000418**--The Variation Board provides the following circuits:
   - A) Two cascaded dividers which provide the "8" and "16" measure signals for the Autovari measures switch.
   - B) A four-station lighted pushbutton switch assembly with associated I.C. divider, decoding circuits and variation switch lamp amplifiers.
   - C) Transistor lamp amplifier for Tempo, Measure I and Measure II.

A CMOS "Dual D" divider package (I.C. 2) is used to provide the "8" and "16" measure signals for the automatic variation mode. The first divider input, Z1-Pin 12, is connected directly to the Z1 output of the Pattern Generator Board. The first divider output (Z2) is one half the frequency of the input and Z3 is one fourth the frequency of the input. The outputs are +14 volts square waves which are wired directly to the "8" and "16" positions of the measures switch. The reset input (Pin 13) receives a +14 volt reset pulse each time the rhythm unit starts sounding.

The output of the measures switch is connected through a .01 mfd. capacitor to the Autovari switch. When the Autovari switch is "on", this signal is connected through the variation clock input (Pin 6) to R16, D1, R17 and pin 3 of I.C. 1. These components are used to differentiate the various clock input signals and drive the two cascaded dividers (I.C. 1). The divider outputs, which are designated y^2 (first stage) and y^3 (second stage), are used to drive the variation decoding circuit inside the 075-000430 rhythm I.C. and the "2 input and" circuits which drive the four variation lamps. The "and" circuit for variation A is comprised of D10, D11, R29 and Q8. Diodes D12 and D13 are used to bias the emitters of Q5-Q8 at approximately +1.6 volts. This bias is needed because of a possible high "0" level at the output of the I.C. When Y2 and Y3 are both at a "1" level, D10 and D11 will be reverse biased and R29 will supply base current to Q8 which

FIGURE 3-30
AUTO VARI - 64 RHYTHM
THEORY OF OPERATION
(SHEET 1 OF 2)

OPERATION (SHEET 2 OF 2)

used to generate all low fre-
s. These oscillators are
ulse which provides bias to
R-C time constant at the input
rmines the length of time the

ator circuit is the Bass Drum
ng pulse is applied to Pin
nd R3. Diode D1 allows
e capacitor C2. Capacitor
the oscillator time constant
y on Bass Drum and Conga
rt of the input pulse dir-
auses transistor Q1 to be
rt time. This condition
tone when the bass drum
R8 provide a small amount of
r to give the voice envel-
C4, C5 and C6 and resistors
y of the oscillator. Resis-
lector current when the oscil-
0 controls the amount of bass
requency preamplifier.
y oscillators have capaci-
level resistor (such as C12
or is used to remove some
e voice output.

transistor Q9 by reverse bias-
nto a zener region. The
R77. The white noise output
the base of a common emitter
e output is controlled by
ed for a nominal peak-to-peak
output of the white noise
ur white noise gates through
n networks.

he Snare Drum is also used
tive Snare Drum input applied
8 and D11 to charge up cap-
ough R73 and the base of
"on", white noise coupled to
is amplified by Q11. Cap-
e noise frequency spectrum
tput level. The Rim Shot
gh C25, D9, and R72 to the

) is similar to the Snare
output frequency spectrum
tank circuit (L2 and C61).
ircuit is controlled by

ed voice and does not have
her white noise voices do.

The input pulses are coupled directly to Q13 through R99, R101, and D14. The output frequency spectrum is shaped by C51 and C52. The output level is set by potentiometer R102.

The Cymbal and Maracas voices share the same white noise gate, but each voice has its own separate time constant circuit.

The Cymbal has a dual slope time constant with the initial attack controlled by C65 and R108, while the rest of the time constant is controlled by C54 and R104. Both Cymbal and Maracas time constants are connected directly to the base of Q14, the white noise gate. The output of Q14 is shaped by LI and C55, and 8 K HZ tank circuit. The output level of the Cymbal/Maracas white noise gate is controlled by R88.

Transistors Q18 and Q19 are used for the low frequency pre-amplifier, which amplifies the outputs of all phase shift oscillator voicing circuits. Potentiometer R127 is used to adjust the gain of the low frequency output channel.

Transistor Q17 is the high frequency (white noise) preamplifier. The output level of the preamp is controlled by potentiometer R121.

Transistors Q15 and Q16 form the two pulse inverters needed to convert -27 volt organ signals to +14 volt pulses for keying the "Play-Along" voices. Pedal signals are applied to Pin 21 and converted to +14 volt signals by Q15. The output of Q15 passes through R114 to two operator selectable switches; Bass Drum on Pedals and Cymbal on Pedals. The outputs of these switches connect to Pins 11 and 3 respectively on the Voicing Board. Transistor Q16 operates in an identical manner for lower manual signals. Diodes D19 and D20 couple lower manual and pedal trigger pulses to the Touch Start circuit on the Pattern Generator Board - 124-000379.

The +14 volts used to operate all Autovari circuits is supplied by R131 and a $\pm 5\%$, 14-volt zener diode D21. Capacitor C76 is used to slow down the initial "turn-on" of the supply voltage and help in absorbing power supply spikes generated by various Autovari circuits. Resistor R129 and capacitor C75 are used to decouple the preamp power supply from the main +25 volt power supply input.

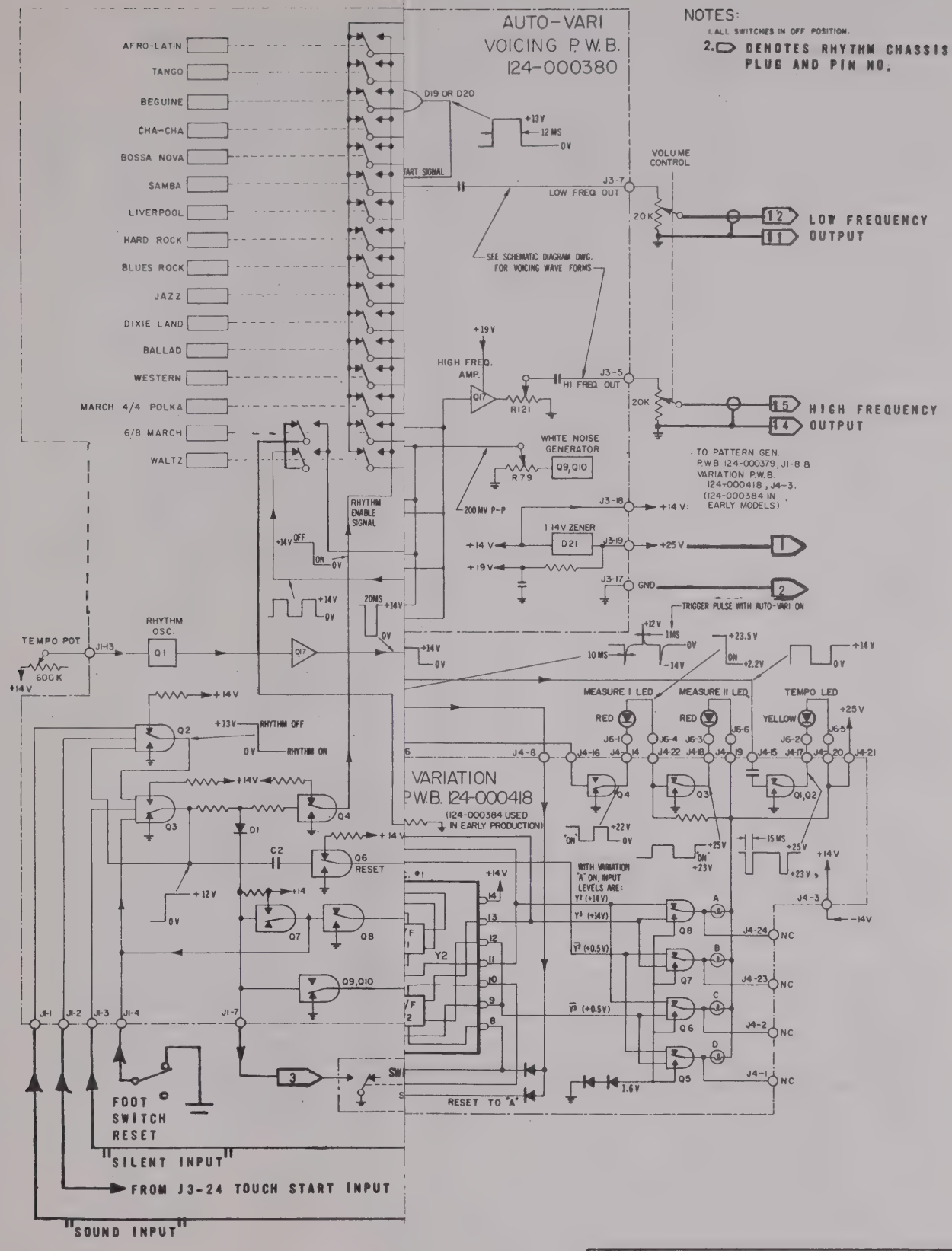


FIGURE 3-32
AUTO VARI - 64 RHYTHM
LOGIC DIAGRAM

AUTO VARI-64 THEORY OF OPERATION (SHEET 2 OF 2)

will then turn on and light variation lamp A.

The reset input (pin 8) receives a +14 volt reset pulse when the Autovari switch is ON and the rhythm unit is switched from SILENT to SOUND. This reset pulse sets both Y2 and Y3 dividers to the "1" state through diodes D2 and D3. This "1" state programs the "430" I.C. for variation "A". The variation clock will then cause the variation to change in a A-B-C-D-A sequence.

The tempo lamp is driven by an amplifier comprised of transistors Q1 and Q2. The input clock is provided by the X^3 divider in the rhythm I.C. This clock is differentiated by C1 and R7 and provides an "ON" time of approximately 15 milliseconds.

The Y^1 divider output from the rhythm I.C. is used to drive transistor Q4, the measure I lamp amplifier. An output from the measure I circuit, located at the junction of R13, Pin 22 and the anode of the measure I L.E.D., is used to drive transistor Q3, the measure II lamp amplifier. When measure I lamp is "ON", transistor Q3 and the measure II lamp will be OFF. When measure I lamp is OFF, transistor Q3 will receive input drive current from R12 and turn "ON", lighting the measure II lamp.

4) VOICING BOARD - 124-000380--The Autovari voicing board contains eleven voices, ten of which are used for the automatic rhythm and one (brush) is only for external keying (lower manual). There are also three prime inputs such as Bass Drum (Pin 11), Snare Drum (Pin 16), and Cymbal (Pin 3), which also are only used for external keying purposes.

There are six basic circuits on this PWB which are listed:

A) Phase Shift Oscillator - There are eight phase shift oscillators which are used for the following voices: Bass Drum (1), Conga (1), Bongo (1), Claves (1), Rim Shot (1), Cowbell (2), and Snare Drum (1).

B) White Noise Generator - There is a white noise generator which supplies all the white noise gates with a broad band white noise signal.

C) White Noise Gate - There are four white noise gates which are used for the following voices: Snare Drum Rim Shot (1), Brush (1), Sand Block (1), Cymbal and Maracas (1).

D) Preamplifiers - There are two preamplifiers used to collect and amplify rhythm output signals. One preamp is used for all low frequency voices (phase shift oscillators) while the other is used for all white noise voices.

E) Pulse Inverters - There are two pulse inverter circuits which convert negative organ pulses to positive pulses for voice triggers. One circuit is used for pedal pulses while the other is used for lower manual pulses.

F) Power Supply - There is a +14 volt power supply which supplies all three rhythm boards with a stable supply voltage.

The phase shift oscillators are used to generate all low frequency (60 HZ to 2,500 HZ) voices. These oscillators are turned on by a positive keying pulse which provides bias to the oscillator transistors. An R-C time constant at the input of each oscillator circuit determines the length of time the oscillator is on.

An example of phase shift oscillator circuit is the Bass Drum voicing circuit. The input keying pulse is applied to Pin 12 and is differentiated by C1 and R3. Diode D1 allows only the positive pulse to charge capacitor C2. Capacitor C2 and resistors R6 and R8 form the oscillator time constant circuit. Capacitor C3 (used only on Bass Drum and Conga circuits) is used to couple a part of the input pulse directly to the base of Q1, which causes transistor Q1 to be driven into saturation for a short time. This condition creates the "thump" or "strike" tone when the bass drum first sounds. Resistors R1 and R8 provide a small amount of forward bias (.42 volts) in order to give the voice envelope a long "tail". Capacitors C4, C5 and C6 and resistors R4 and R5 determine the frequency of the oscillator. Resistors R2 and R9 determine the collector current when the oscillator is turned on. Resistor R10 controls the amount of bass drum signal applied to the low frequency preamplifier. Note that all other low frequency oscillators have capacitors in series with the output level resistor (such as C12 for Conga). This series capacitor is used to remove some low frequency components from the voice output.

The white noise is generated by transistor Q9 by reverse biasing the emitter-base junction into a zener region. The zener current is controlled by R77. The white noise output passes through capacitor C45 to the base of a common emitter amplifier (Q10). The white noise output is controlled by potentiometer R79, and is adjusted for a nominal peak-to-peak reading of 200 millivolts. The output of the white noise potentiometer is connected to four white noise gates through four capacitor/resistor isolation networks.

The white noise gate (Q11) for the Snare Drum is also used for the Rim Shop voice. A positive Snare Drum input applied to Pin 15 is coupled through C58 and D11 to charge up capacitor C44, which discharges through R73 and the base of transistor Q11. With Q11 turned "on", white noise coupled to the base of Q11 by R81 and C48 is amplified by Q11. Capacitor C46 and C47 shape the white noise frequency spectrum and resistor R76 controls the output level. The Rim Shot input (Pin 13) is coupled through C25, D9, and R72 to the white noise gate.

The Brush white noise gate (Q12) is similar to the Snare Drum noise gate except that the output frequency spectrum is shaped by a 12 K HZ resonant tank circuit (L2 and C61). The output level of the Brush circuit is controlled by potentiometer R97.

The Sand Block is a DC-controlled voice and does not have a percussive envelope as the other white noise voices do.

The input pulses are coupled directly to Q13 through R99, R101, and D14. The output frequency spectrum is shaped by C51 and C52. The output level is set by potentiometer R102.

The Cymbal and Maracas voices share the same white noise gate, but each voice has its own separate time constant circuit.

The Cymbal has a dual slope time constant with the initial attack controlled by C65 and R108, while the rest of the time constant is controlled by C54 and R104. Both Cymbal and Maracas time constants are connected directly to the base of Q14, the white noise gate. The output of Q14 is shaped by L1 and C55, and 8 K HZ tank circuit. The output level of the Cymbal/Maracas white noise gate is controlled by R88.

Transistors Q18 and Q19 are used for the low frequency preamplifier, which amplifies the outputs of all phase shift oscillator voicing circuits. Potentiometer R127 is used to adjust the gain of the low frequency output channel.

Transistor Q17 is the high frequency (white noise) preamplifier. The output level of the preamp is controlled by potentiometer R121.

Transistors Q15 and Q16 form the two pulse inverters needed to convert -27 volt organ signals to +14 volt pulses for keying the "Play-Along" voices. Pedal signals are applied to Pin 21 and converted to +14 volt signals by Q15. The output of Q15 passes through R114 to two operator selectable switches; Bass Drum on Pedals and Cymbal on Pedals. The outputs of these switches connect to Pins 11 and 3 respectively on the Voicing Board. Transistor Q16 operates in an identical manner for lower manual signals. Diodes D19 and D20 couple lower manual and pedal trigger pulses to the Touch Start circuit on the Pattern Generator Board - 124-000379.

The +14 volts used to operate all Autovari circuits is supplied by R131 and a ±5%, 14-volt zener diode D21. Capacitor C76 is used to slow down the initial "turn-on" of the supply voltage and help in absorbing power supply spikes generated by various Autovari circuits. Resistor R129 and capacitor C75 are used to decouple the preamp power supply from the main +25 volt power supply input.

FIGURE 3-31
AUTO VARI - 64 RHYTHM
THEORY OF OPERATION
(SHEET 2 OF 2)

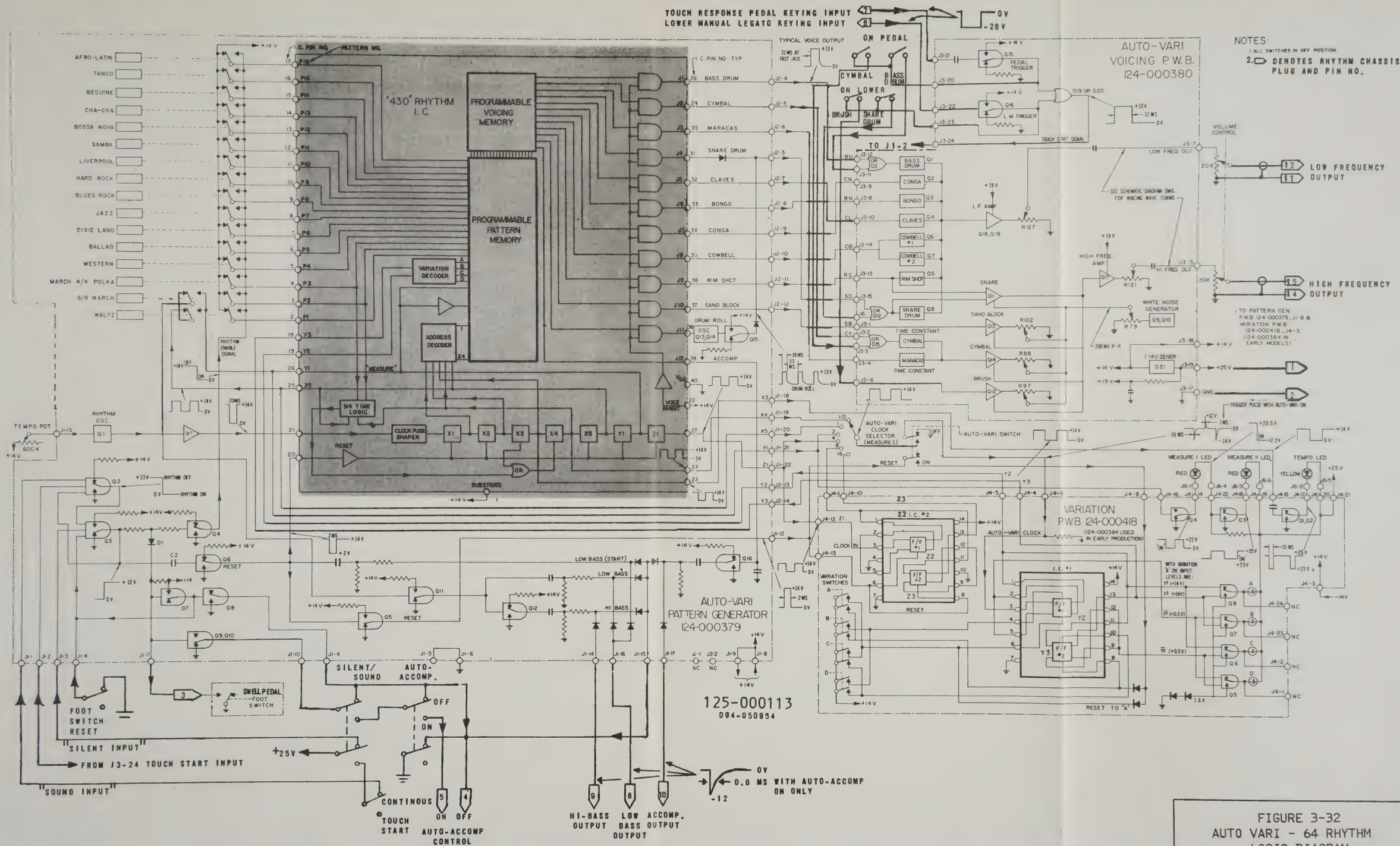
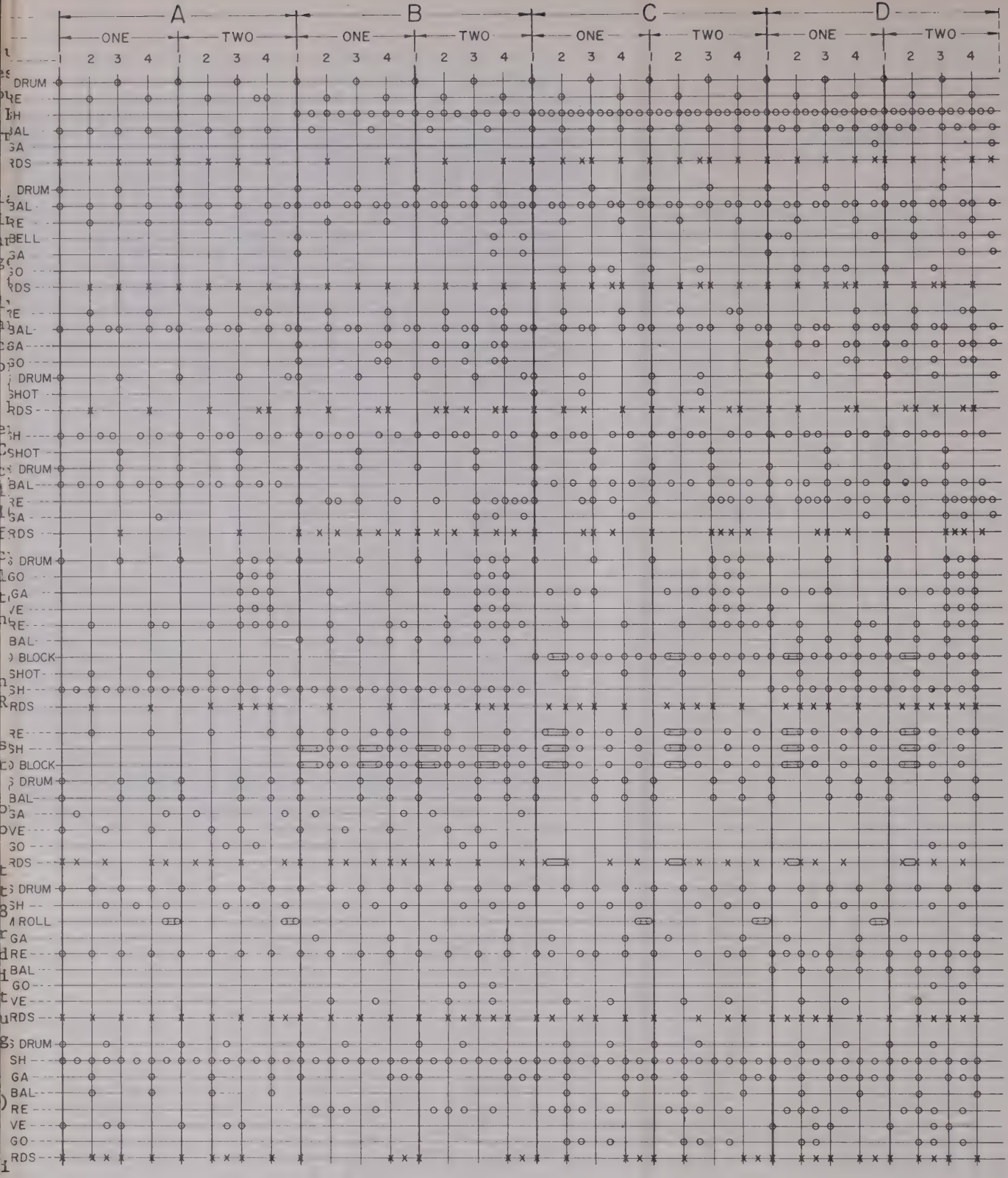
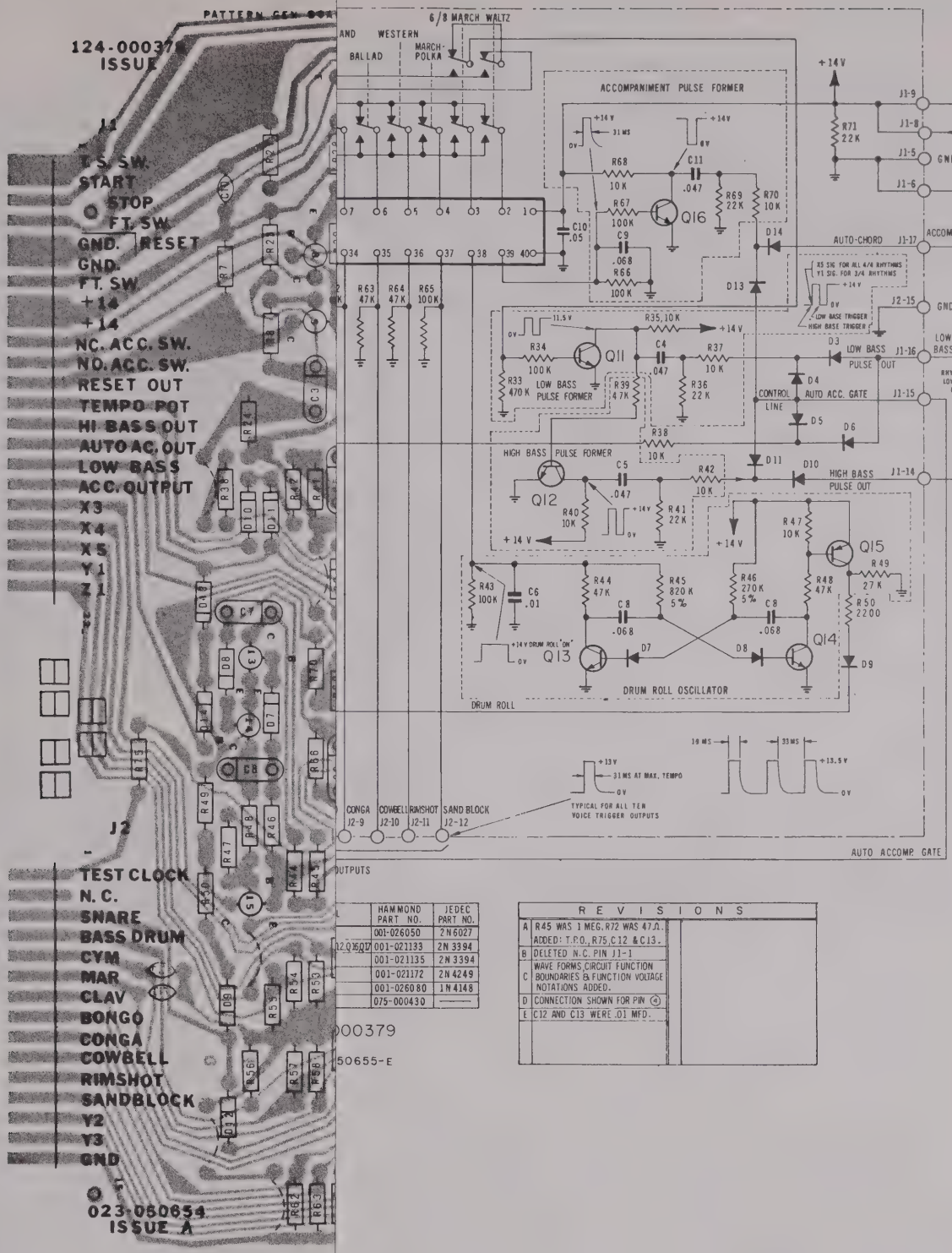


FIGURE 3-32
AUTO VARI - 64 RHYTHM
LOGIC DIAGRAM



AND VARIATION CHART



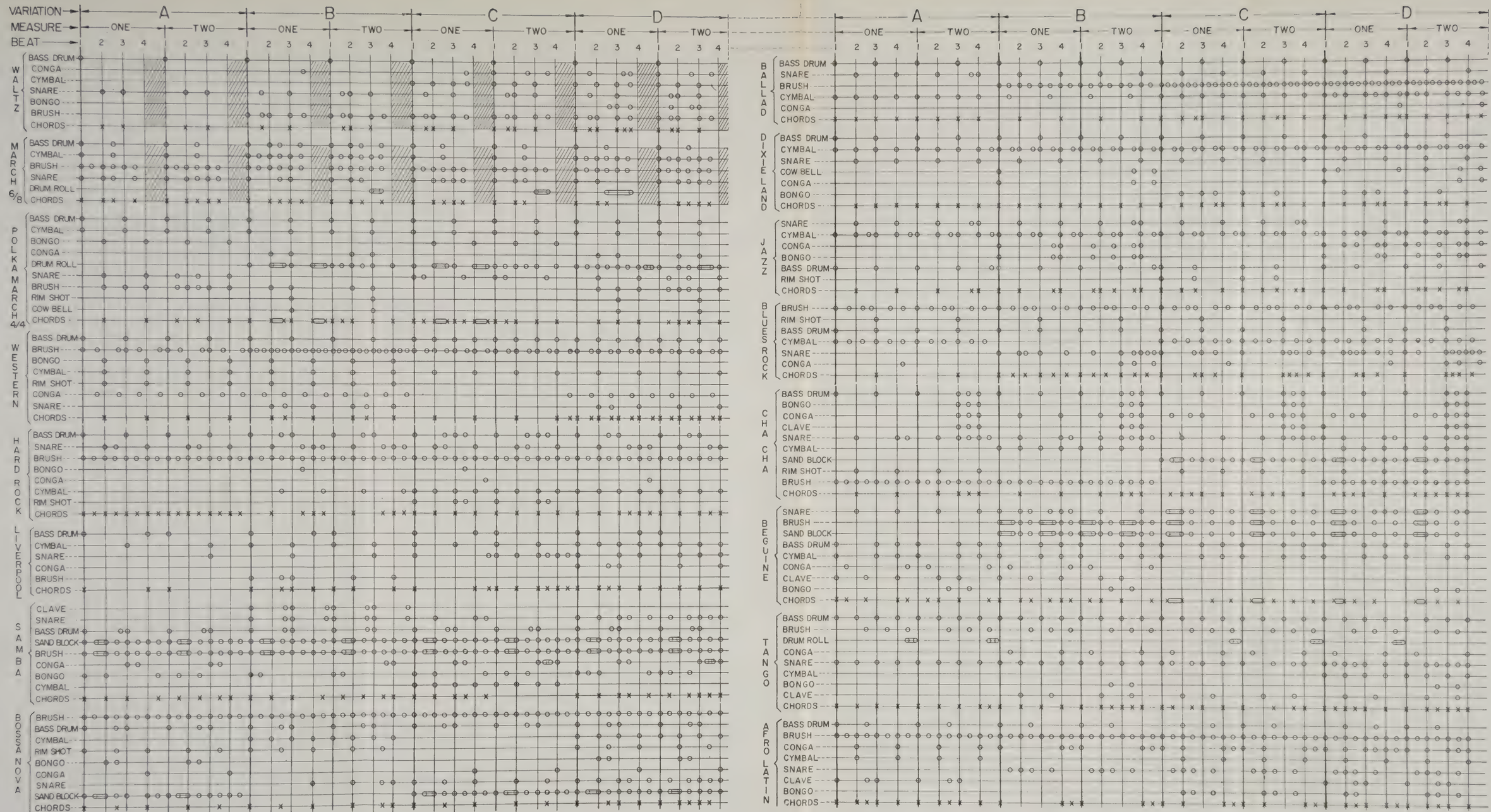
	HAMMOND PART NO.	JEDEC PART NO.
	001-026050	2N6027
Q15,Q16,Q17	001-021133	2N3394
	001-021135	2N3394
	001-021172	2N4249
	001-026080	1N4148
	075-000430	——

000379

50655-E

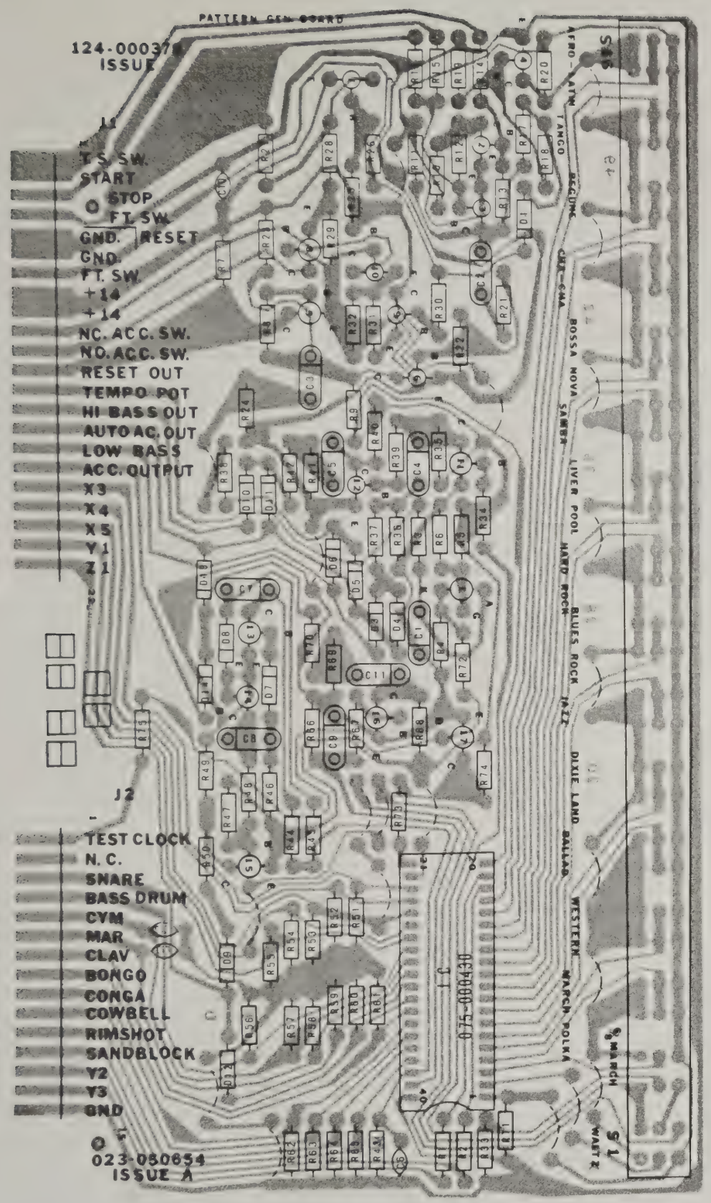
REVISIONS		
A	R45 WAS 1 MEG, R72 WAS 47Ω. ADDED: T.P.O., R75, C12 & C13.	
B	DELETED N.C. PIN J1-1	
C	WAVE FORMS, CIRCUIT FUNCTION BOUNDARIES & FUNCTION VOLTAGE NOTATIONS ADDED.	
D	CONNECTION SHOWN FOR PIN ④	
E	C12 AND C13 WERE .01 MFD.	

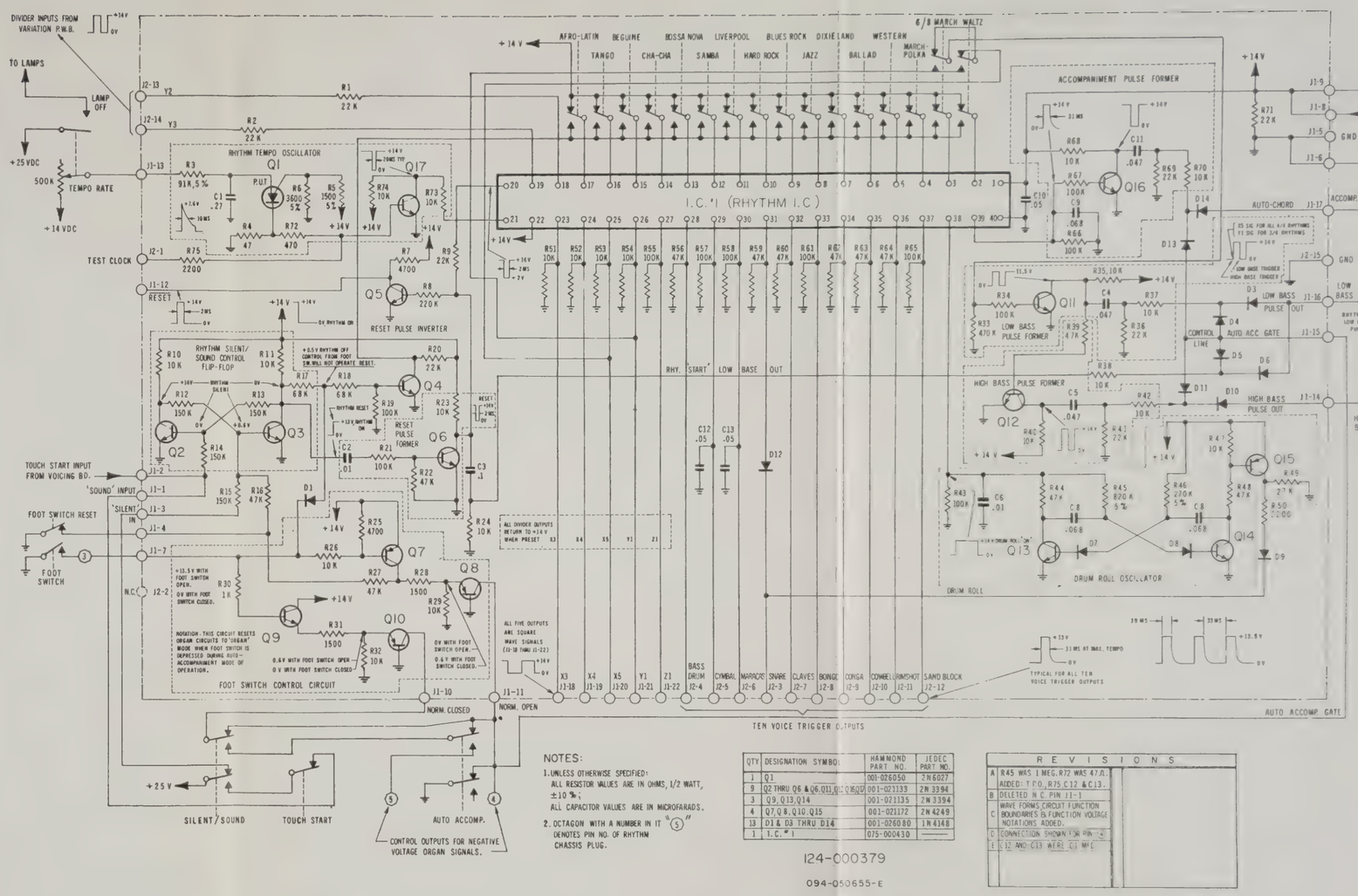
FIGURE 3-34
RHYTHM PATTERN GENERATOR BOARD
SCHEMATIC AND LAYOUT
(124-000379)



AUTO VARI-64 RHYTHM TRACKS AND VARIATION CHART

FIGURE 3-33
AUTO VARI - 64 RHYTHM
TRACKS AND PATTERN CHART





NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±10 %;
   ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. OCTAGON WITH A NUMBER IN IT "(5)" DENOTES PIN NO. OF RHYTHM CHASSIS PLUG.

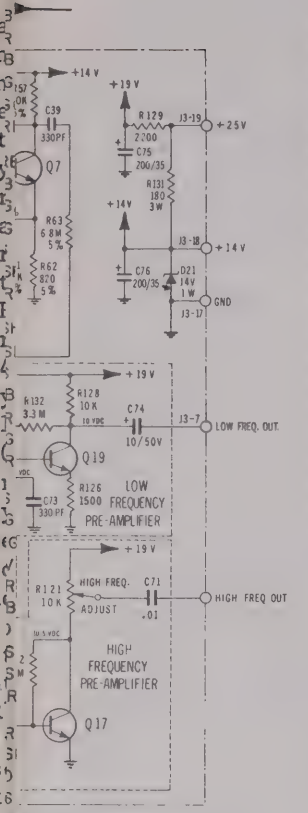
QTY	DESIGNATION SYMBOL	HAMMOND PART NO.	JEDEC PART NO.
1	Q1	001-026050	2N6027
9	Q2 THRU Q6 & Q8, Q11, Q12, Q15	001-021133	2N3394
3	Q9, Q13, Q14	001-021135	2N3394
4	Q7, Q8, Q10, Q15	001-021172	2N4249
13	D1 & D3 THRU D14	001-026080	1N4148
1	I.C. #1	075-000430	——

124-000379

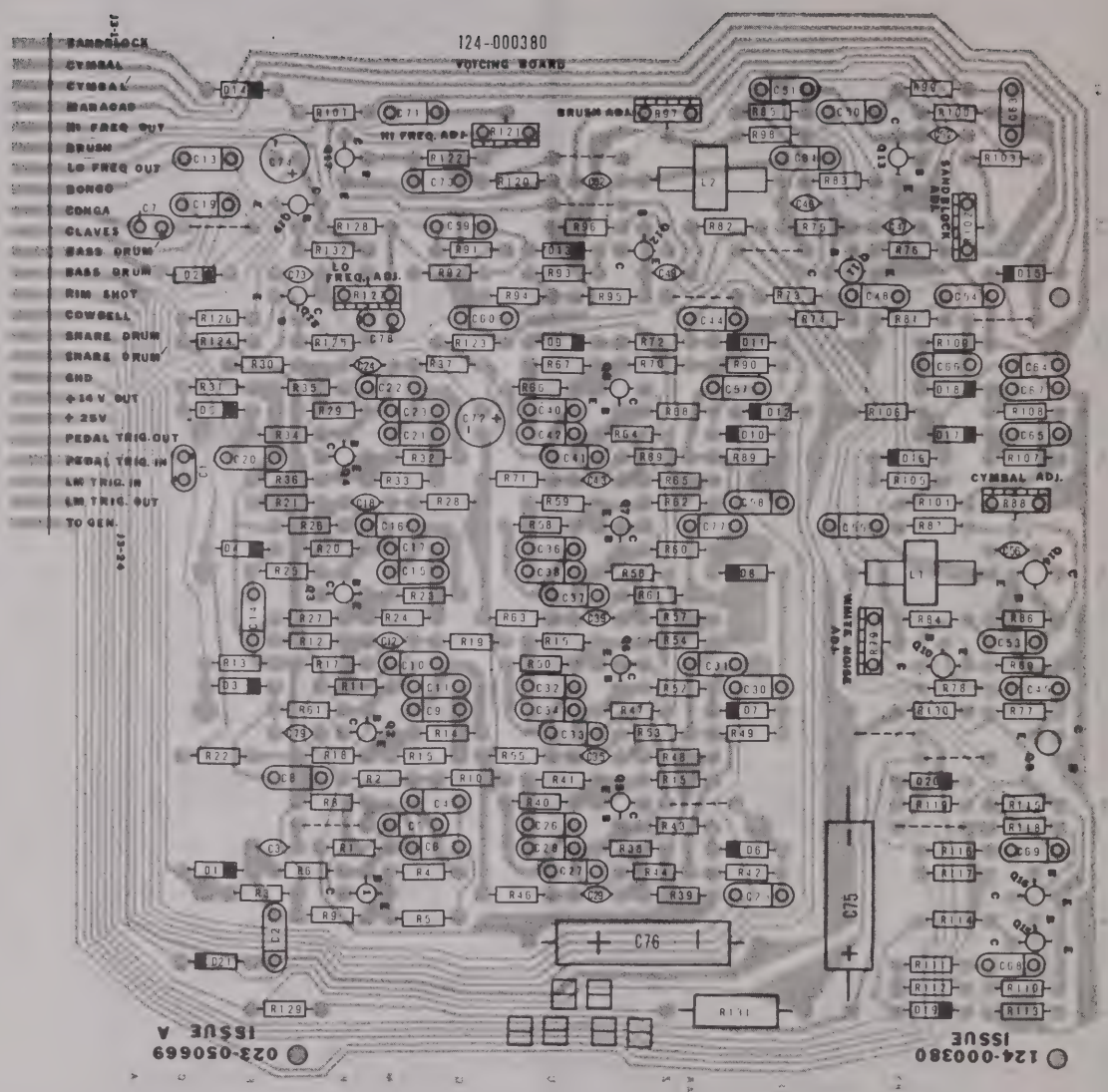
094-050655-E

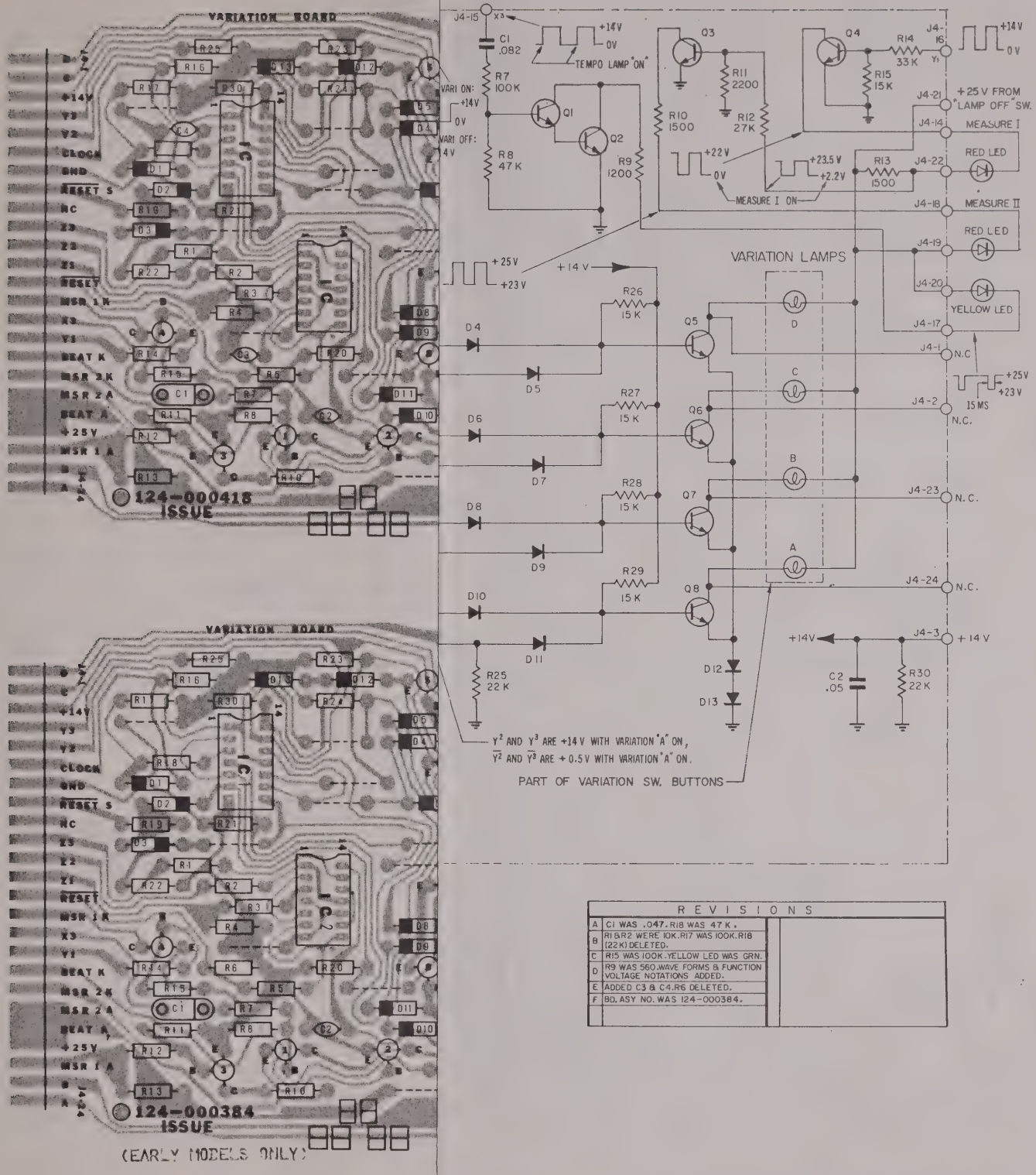
REVISIONS	
A	R45 WAS 1 MEG. R72 WAS 47 Ω. ADDED: T.P.O., R75, C12 & C13.
B	DELETED N.C. PIN J1-1
C	WAVE FORMS, CIRCUIT FUNCTION BOUNDARIES & FUNCTION VOLTAGE NOTATIONS ADDED.
D	CONNECTION SHOWN FOR PIN -2
E	C12 AND C13 WERE .01 MFD.

FIGURE 3-34
RHYTHM PATTERN GENERATOR BOARD
SCHEMATIC AND LAYOUT
(124-000379)



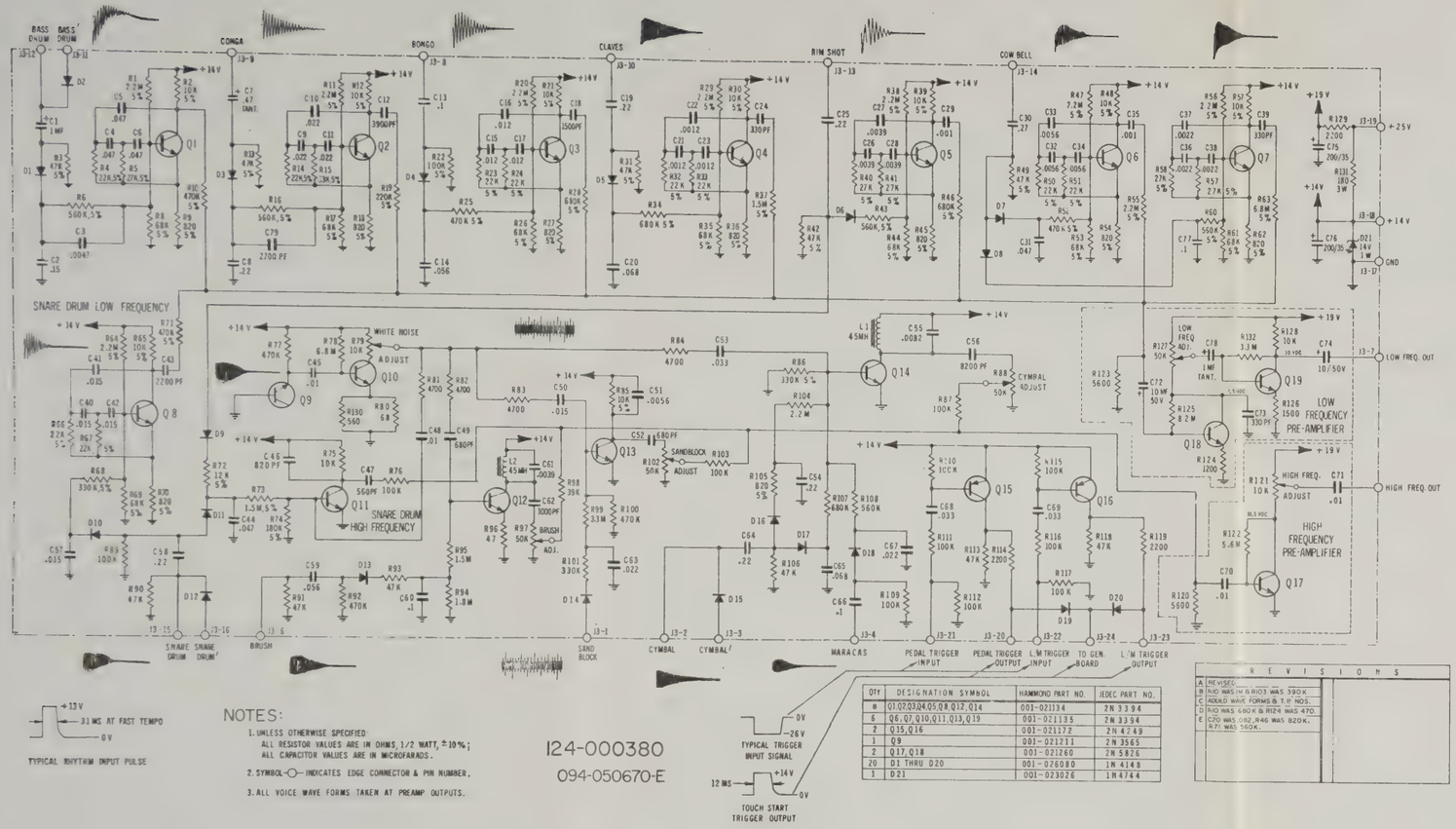
REVISIONS	
IM & R103 WAS 390K. AVE FORMS & T.P. NOS. 680K & R124 WAS 470. .082, R46 WAS 820K. 560K.	





REVISIONS		
A	C1 WAS .047. R18 WAS 47K.	
B	R1 & R2 WERE 10K. R17 WAS 100K. R18 (22K) DELETED.	
C	R15 WAS 100K. YELLOW LED WAS GRN.	
D	R9 WAS 560. WAVE FORMS & FUNCTION VOLTAGE NOTATIONS ADDED.	
E	ADDED C3 & C4. R6 DELETED.	
F	BD. ASY NO. WAS 124-000384.	

FIGURE 3-36
RHYTHM VARIATION BOARD
SCHEMATIC AND LAYOUT
(124-000418)



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±10%;
   ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. SYMBOL —○— INDICATES EDGE CONNECTOR & PIN NUMBER.
3. ALL VOICE WAVE FORMS TAKEN AT PREAMP OUTPUTS.

124-000380
094-050670-E

QTY	DESIGNATION SYMBOL	HAMMOND PART NO.	JEDEC PART NO.
8	Q1,Q2,Q3,Q4,Q5,Q8,Q12,Q14	001-021134	2N 3394
6	Q6,Q7,Q10,Q11,Q13,Q19	001-021135	2N 3394
2	Q15,Q16	001-021172	2N 4249
1	Q9	001-021211	2N 3565
2	Q17,Q18	001-021260	2N 5826
20	D1 THRU D20	001-026080	1N 4148
1	D21	001-023026	1N 4744

REVISIONS	
A	REVISED
B	R10 WAS 1M & R103 WAS 390K
C	ADDED WAVE FORMS & T.P. NOS.
D	R10 WAS 680K & R124 WAS 470.
E	C20 WAS .082, R46 WAS 820K. R71 WAS 560K.

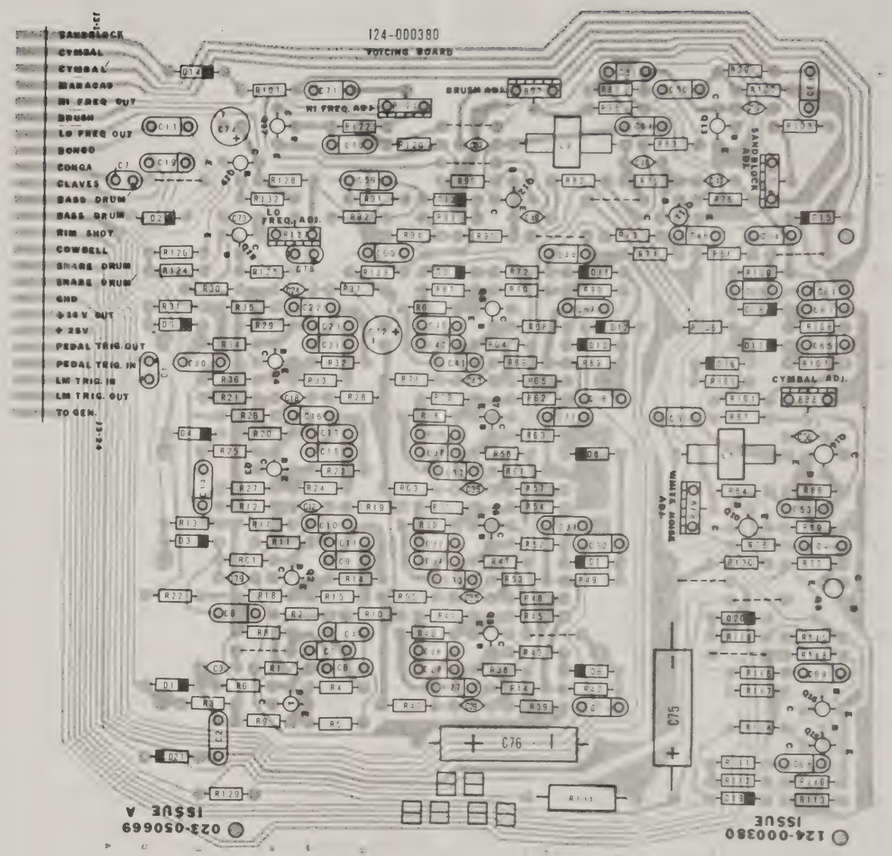
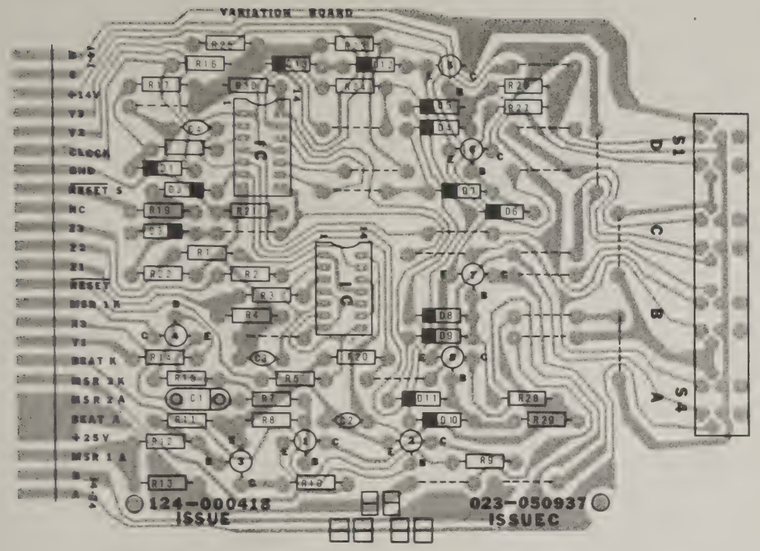
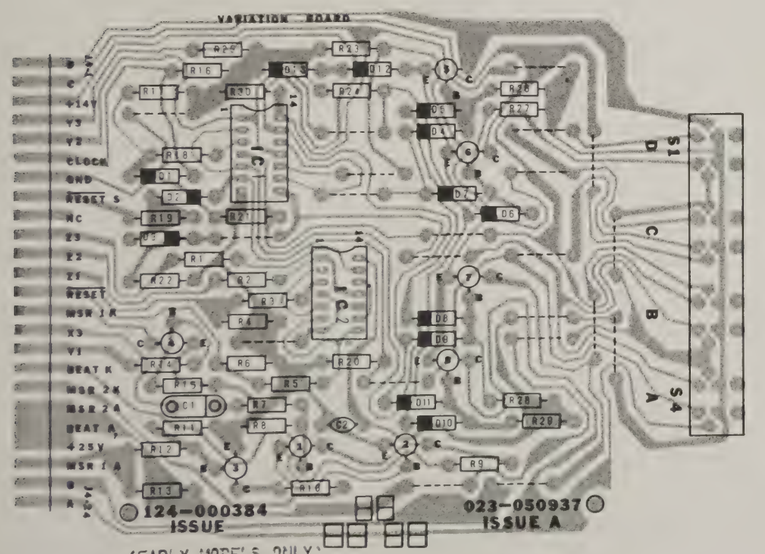
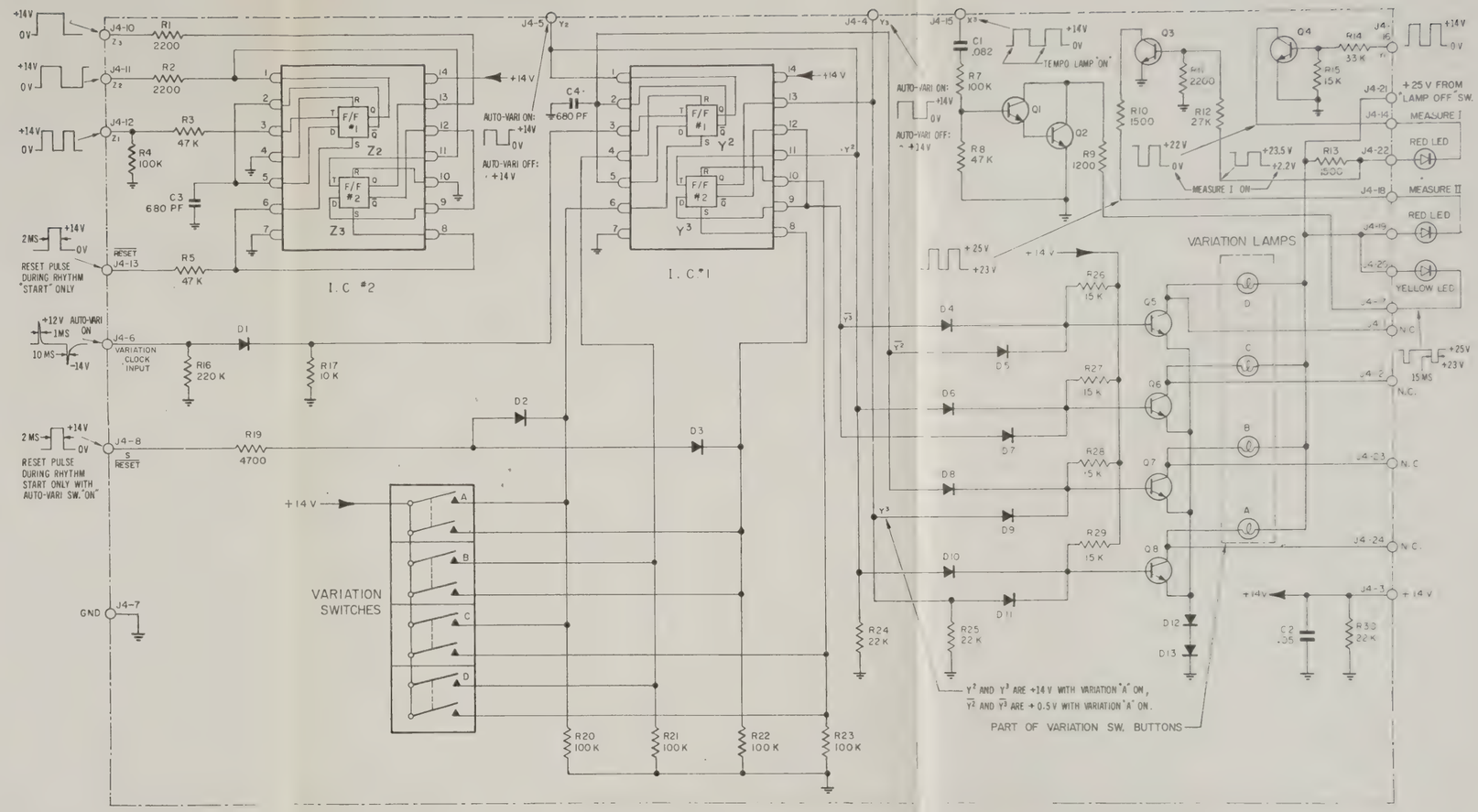


FIGURE 3-35
RHYTHM VOICING BOARD
SCHEMATIC AND LAYOUT
(124-000380)





(EARLY MODELS ONLY)



NOTES:

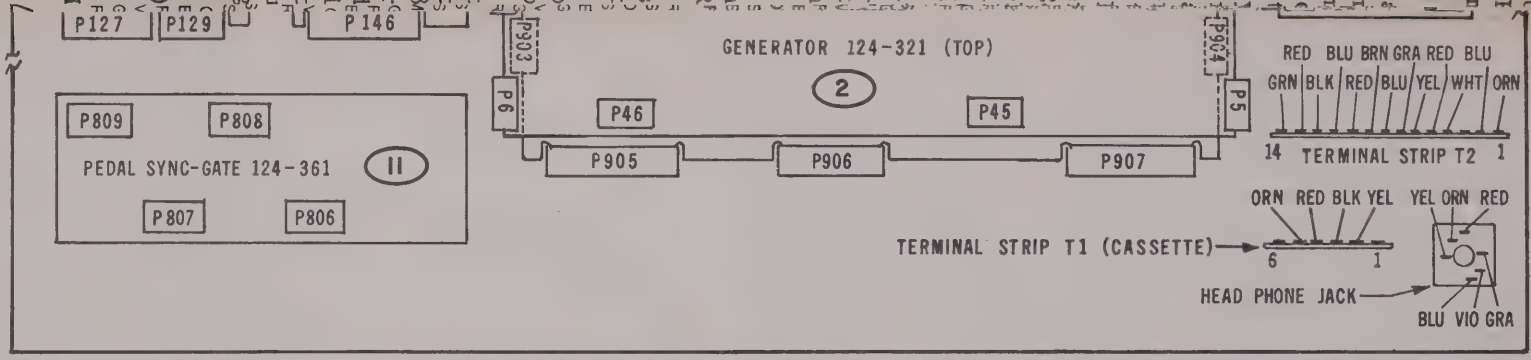
1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±10%;
   ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. LAMPS SHOWN ARE G.E.#85.
3. SYMBOL —○— INDICATES EDGE CONNECTOR PIN NUMBER.

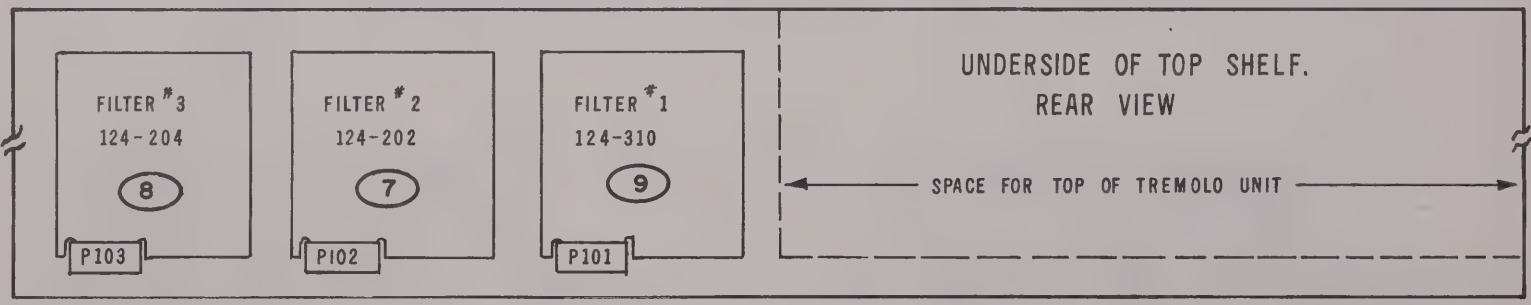
QTY	DESIGNATION SYMBOL	HAMMOND PART #	JEDEC PART #
8	Q1 THRU Q8	001-021135	2N 3394
13	D1 THRU D13	001-026080	IN 4148
2	I.C.#1 & I.C.#2	075-000100	———

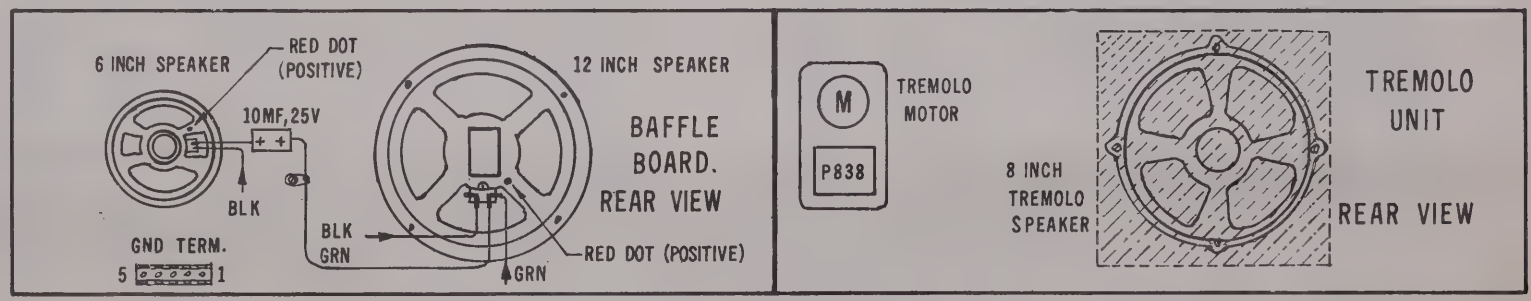
124-000418
094-050938-F

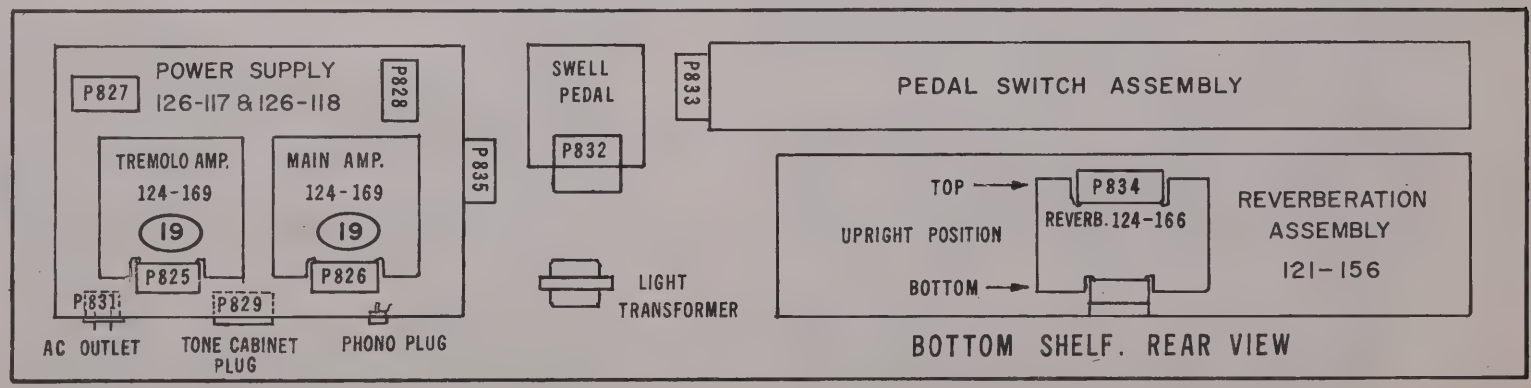
REVISIONS		
A	C1 WAS .047. R8 WAS 47 K.	
B	R1 & R2 WERE 10K. R17 WAS 100K. R18 122K DELETED.	
C	R15 WAS 100K. YELLOW LED WAS GRN.	
D	R9 WAS 560. WAVE FORMS & FUNCTION VOLTAGE NOTATIONS ADDED.	
E	ADDED C3 & C4. R6 DELETED.	
F	BD. ASY. NO. WAS 124-000384.	

FIGURE 3-36
RHYTHM VARIATION BOARD
SCHEMATIC AND LAYOUT
(124-000418)









RGAN. CONNECTOR & PLUG LOCATIONS.

(2) PLUG P-1 - 124-0003

FROM	TO
P-1	P812-9
P-2	
P-3	P810-11
P-4	
P-5	P812-21
P-6	
P-7	P810-23
P-8	
P-9	P812-8
P-10	
P-11	P810-10
P-12	
P-13	P812-20
P-14	
P-15	P810-22
P-16	
P-17	P812-7
P-18	
P-19	P810-9
P-20	
P-21	P812-19

(2) PLUG P-2 - 124-0003

FROM	TO
P-2-1	P810-21
P-2-2	
P-2-3	P812-6
P-2-4	
P-2-5	P810-8
P-2-6	
P-2-7	P812-18
P-2-8	
P-2-9	P810-20
P-2-10	
P-2-11	P812-5
P-2-12	
P-2-13	P810-7
P-2-14	
P-2-15	P812-17
P-2-16	
P-2-17	P810-19
P-2-18	
P-2-19	P812-4
P-2-20	
P-2-21	P810-6

(2) PLUG P-45 - 124-000321 (GENERATOR BOARD)

FROM	TO	BOARD	COLOR
P-45-1	P-807-12	361	BLACK
P-45-2	P-807-10	361	WHITE
P-45-3	P-807-8	361	BLACK
P-45-4	P-807-6	361	WHITE
P-45-5	P-807-4	361	BLACK
P-45-6	P-807-2	361	WHITE

(2) PLUG P-46 - 124-000321 (GENERATOR BOARD)

FROM	TO	BOARD	COLOR
P-46-1	P-806-12	361	BLACK
P-46-2	P-896-10	361	WHITE
P-46-3	P-806-8	361	BLACK
P-46-4	P-806-6	361	WHITE
P-46-5	P-806-4	361	BLACK
P-46-6	P-806-2	361	WHITE

(9) PLUB P-101 - 124-000310 (SINE FILTER #1)

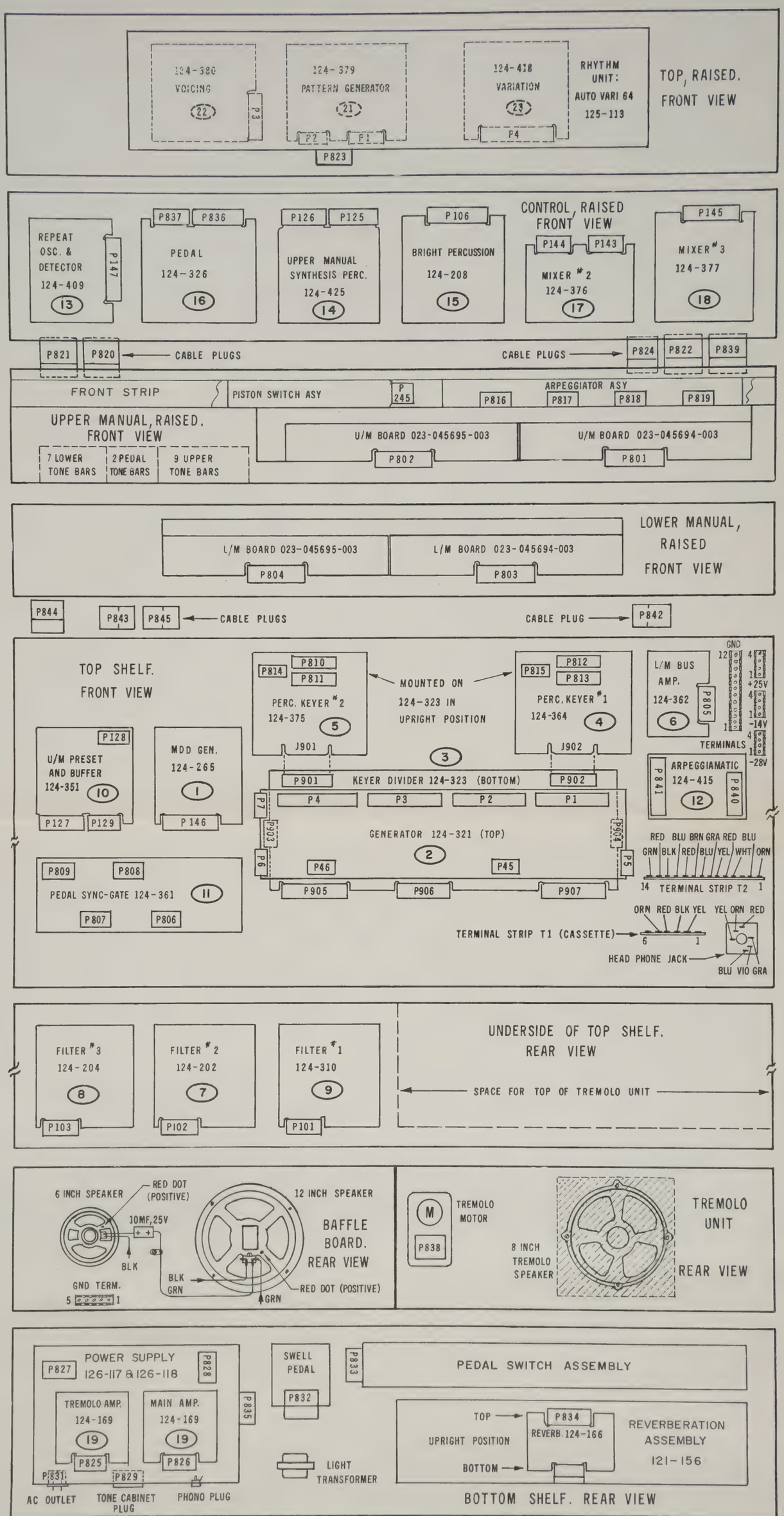
FROM	TO	BOARD	COLOR
P-101-1	P-102-1 P-103-1	202 204	GREEN
P-101-2	P-102-2 P-103-2 GND STRIP	202 204	BLACK
P-101-3	EMPTY		
P-101-4	EMPTY		
P-101-5	EMPTY		
P-101-6	P-5-1	321	WHITE
P-101-7	P-5-2	321	GREEN
P-101-8	P-5-3	221	WHITE
P-101-9	EMPTY		
P-101-10	EMPTY		
P-101-11	P-102-9	202	WHITE
P-101-12	EMPTY		

(7) PLUG P-102 - 124-000202 (SINE FILTER #2)

FROM	TO	BOARD	COLOR
P-102-1	P-103-1 P-101-1	204 310	GREEN GREEN
P-102-2	P-103-2 P-101-2 GND STRIP	204 310	BLACK BLACK BLACK
P-102-3	P-103-4 P-828-12	204 P.S.	WHITE
P-102-4	P-5-4	321	GREEN
P-102-5	P-5-6	321	WHITE
P-102-6	P-5-8	321	GREEN
P-102-7	P-5-10	321	WHITE
P-102-8	+25 TERM. STRIP		GREEN
P-102-9	P-101-11	310	WHITE
P-102-10	EMPTY		
P-102-11	P-822-12 CABLE		
P-102-12	P-103-11	204	WHITE

FIGURE 3-38
PLUG & PIN NUMBER WIRING CHART
(PLUG #1 THRU P-102)

FIGURE 3-37
PHYSICAL LAYOUT OF 8200
SERIES ORGAN
CONENCTOR AND PLUG LOCATION


124-380 VOICING (22) P3
124-379 PATTERN GENERATOR (21) P2 P1
124-418 VARIATION (23) P4
RHYTHM UNIT: AUTO VARI 64 125-113
P823
TOP, RAISED. FRONT VIEW
REPEAT OSC. & DETECTOR 124-409 (13) P147
P837 P836 PEDAL 124-326 (16)
P126 P125 UPPER MANUAL SYNTHESIS PERC. 124-425 (14)
P106 BRIGHT PERCUSSION 124-208 (15)
CONTROL, RAISED FRONT VIEW
P144 P143 MIXER #2 124-376 (17)
P145 MIXER #3 124-377 (18)
P821 P820 CABLE PLUGS
CABLE PLUGS P824 P822 P839
FRONT STRIP
PISTON SWITCH ASY P245
ARPEGGIATOR ASY P816 P817 P818 P819
UPPER MANUAL, RAISED. FRONT VIEW
7 LOWER TONE BARS
2 PEDAL TONE BARS
9 UPPER TONE BARS
U/M BOARD 023-045695-003 P802
U/M BOARD 023-045694-003 P801
L/M BOARD 023-045695-003 P804
L/M BOARD 023-045694-003 P803
LOWER MANUAL, RAISED FRONT VIEW
P844 P843 P845 CABLE PLUGS
CABLE PLUG P842
TOP SHELF. FRONT VIEW
P814 P810 P811 PERC. KEYER #2 124-375 (5)
MOUNTED ON 124-323 IN UPRIGHT POSITION
P815 P812 P813 PERC. KEYER #1 124-364 (4)
L/M BUS AMP. 124-362 (6) P805
GND +25V -14V -28V TERMINALS
P128 U/M PRESET AND BUFFER 124-351 (10) P127 P129
MDD GEN. 124-265 (1) P146
J901 J902 (3)
P901 KEYER DIVIDER 124-323 (BOTTOM) P902
P4 P3 P2 P1
P7 P903 P6 P904 P5
GENERATOR 124-321 (TOP) (2)
P46 P45
P905 P906 P907
ARPEGGIAMATIC 124-415 (12) P841 P840
RED BLU BRN GRA RED BLU
GRN BLK RED BLU YEL WHT ORN
14 TERMINAL STRIP T2 1
P809 P808 PEDAL SYNC-GATE 124-361 (11) P807 P806
ORN RED BLK YEL YEL ORN RED
TERMINAL STRIP T1 (CASSETTE) 6 1
HEAD PHONE JACK
BLU VIO GRA
FILTER #3 124-204 (8) P103
FILTER #2 124-202 (7) P102
FILTER #1 124-310 (9) P101
UNDERSIDE OF TOP SHELF. REAR VIEW
SPACE FOR TOP OF TREMOLO UNIT
6 INCH SPEAKER
RED DOT (POSITIVE)
10MF,25V
BLK
GND TERM. 5 1
12 INCH SPEAKER
BAFFLE BOARD. REAR VIEW
BLK GRN
GRN
RED DOT (POSITIVE)
M P838 TREMOLO MOTOR
8 INCH TREMOLO SPEAKER
TREMOLO UNIT REAR VIEW
P827 POWER SUPPLY 126-117 & 126-118 P828
TREMOLO AMP. 124-169 (19) P825
MAIN AMP. 124-169 (19) P826
P835
SWELL PEDAL P832
P833 PEDAL SWITCH ASSEMBLY
TOP UPRIGHT POSITION BOTTOM
P834 REVERB. 124-166
REVERBERATION ASSEMBLY 121-156
LIGHT TRANSFORMER
P831 AC OUTLET
P829 TONE CABINET PLUG
PHONO PLUG
BOTTOM SHELF. REAR VIEW

PHYSICAL LAYOUT OF 8200 SERIES SPINET ORGAN. CONNECTOR & PLUG LOCATIONS.

POINT TO POINT WIRING CHART OF 8200 SERIES ORGAN (PLUG & PIN NOS.)

SEE PHYSICAL LAYOUT (PAGE 3-38)

(2) PLUG P-1 - 124-000321 (GENERATOR BOARD)

FROM	TO	BOARD	COLOR
P-1	P812-9	364	YELLOW
P-2			
P-3	P810-11	375	VIOLET
P-4			
P-5	P812-21	364	YELLOW
P-6			
P-7	P810-23	375	VIOLET
P-8			
P-9	P812-8	364	VIOLET
P-10			
P-11	P810-10	375	YELLOW
P-12			
P-13	P812-20	364	VIOLET
P-14			
P-15	P810-22	375	YELLOW
P-16			
P-17	P812-7	364	YELLOW
P-18			
P-19	P810-9	375	VIOLET
P-20			
P-21	P812-19	364	YELLOW

(2) PLUG P-2 - 124-000321 (GENERATOR BOARD)

FROM	TO	BOARD	COLOR
P-2-1	P810-21	375	VIOLET
P-2-2			
P-2-3	P812-6	364	VIOLET
P-2-4			
P-2-5	P810-8	375	YELLOW
P-2-6			
P-2-7	P812-18	364	VIOLET
P-2-8			
P-2-9	P810-20	375	YELLOW
P-2-10			
P-2-11	P812-5	364	YELLOW
P-2-12			
P-2-13	P810-7	375	VIOLET
P-2-14			
P-2-15	P812-17	364	YELLOW
P-2-16			
P-2-17	P810-19	375	VIOLET
P-2-18			
P-2-19	P812-4	364	VIOLET
P-2-20			
P-2-21	P810-6	375	YELLOW

(2) P-2 - 134-000321 (GENERATOR BOARD)

FROM	TO	BOARD	COLOR
P-3-1	P812-16	364	VIOLET
P-3-2			
P-3-3	P810-18	375	YELLOW
P-3-4			
P-3-4	P812-3	364	YELLOW
P-3-6			
P-3-7	P810-5	375	VIOLET
P-3-8			
P-3-9	P812-15	364	YELLOW
P-3-10			
P-3-11	P810-7	375	VIOLET
P-3-12			
P-3-13	P812-2	364	VIOLET
P-3-14			
P-3-15	P810-4	375	YELLOW
P-3-16			
P-3-17	P812-14	364	VIOLET
P-3-18			
P-3-19	P810-16	375	YELLOW
P-3-20			
P-3-21	P810-3	375	VIOLET

(2) PLUG P-4 - 124-000321 (GENERATOR BOARD)

FROM	TO	BOARD	COLOR
P-4-1	P812-13	364	YELLOW
P-4-2			
P-4-3	P810-15	375	VIOLET
P-4-4			
P-4-5	P810-2	375	YELLOW
P-4-6			
P-4-7	P812-12	364	VIOLET
P-4-8			
P-4-9	P810-14	375	YELLOW
P-4-10			
P-4-11	P812-23	364	YELLOW
P-4-12			
P-4-13	P812-11	364	YELLOW
P-4-14			
P-4-15	P810-13	375	VIOLET
P-4-16			
P-4-17	P812-22	364	VIOLET
P-4-18			
P-4-19	P812-10	364	VIOLET
P-4-20			
P-4-21	P810-12	375	YELLOW

(2) PLUG P-5 - 124-000321 (GENERATOR BOARD)

FROM	TO	BOARD	COLOR
P-5-1	P010-6	310	WHITE
P-5-2	P-101-7	310	GREEN
P-5-3	P-101-8	310	WHITE
P-5-4	P-102-4	202	GREEN
P-5-5	P-103-5	204	GREEN
P-5-6	P-102-5	202	WHITE
P-5-7	P-103-6	204	WHITE
P-5-8	P-102-6	202	GREEN
P-5-9	P-103-7	204	GREEN
P-5-10	P-102-7	202	WHITE
P-5-11	P-103-8	204	WHITE
P-5-11	P-103-8	204	WHITE
P-5-12	P-103-9	204	GREEN
P-5-13	EMPTY		
P-5-14	EMPTY		
P-5-15	EMPTY		

(2) PLUG P-6 - 124-000321 (GENERATOR BOARD)

FROM	TO	BOARD	COLOR
P-6-1	P-129-10	351	WHITE
P-6-2	P-129-8	351	PURPLE
P-6-3	P-129-6	351	GREEN
P-6-4	P-129-7	351	BLUE
P-6-5	P-129-9	351	GRAY
P-6-6	P-129-5	351	YELLOW
P-6-7	P-129-4	351	ORANGE
P-6-8	P-129-3	351	RED
P-6-9	P-129-2	351	BROWN

(2) PLUG P-7 - 124-000321 (GENERATOR BOARD)

FROM	TO	BOARD	COLOR
P-7-1	P-129-11 P-821-8	321	ORANGE/WHITE ORANGE/WHITE
P-7-2	P-146-7 GND. STRIP	265	BLACK BLACK
P-7-3	EMPTY		
P-7-4	P-146-14 P-903-9	265 323	YELLOW YELLOW
P-7-5	P-146-11 P-903-12	265 323	ORANGE ORANGE
P-7-6	P-146-12 P-903-11	265 323	RED RED
P-7-7	P-146-13 P-903-10	265 323	BROWN BROWN
P-7-8	P-146-18 P-903-5	265 323	BLUE BLUE
P-7-9	P-146-17 P-903-6	265 323	PURPLE PURPLE
P-7-10	P-146-16 P-903-7	265 323	GRAY GRAY
P-7-11	P-146-15 P-903-8	265 323	WHITE WHITE
P-7-12	P-146-22 P-903-1	265 323	BROWN BROWN
P-7-13	P-146-21 P-903-2	265 323	RED RED
P-7-14	P-146-19 P-903-3	265 323	ORANGE ORANGE
P-7-15	P-146-19 P-903-4	265 323	YELLOW YELLOW
P-7-16	EMPTY		
P-7-17	P-146-8 -14 TERM. STRIP	265	YELLOW/WHITE YELLOW/WHITE
P-7-18	P-146-9 -28 TERM. STRIP	265	PURPLE PURPLE

(2) PLUG P-45 - 124-000321 (GENERATOR BOARD)

FROM	TO	BOARD	COLOR
P-45-1	P-807-12	361	BLACK
P-45-2	P-807-10	361	WHITE
P-45-3	P-807-8	361	BLACK
P-45-4	P-807-6	361	WHITE
P-45-5	P-807-4	361	BLACK
P-45-6	P-807-2	361	WHITE

(2) PLUG P-46 - 124-000321 (GENERATOR BOARD)

FROM	TO	BOARD	COLOR
P-46-1	P-806-12	361	BLACK
P-46-2	P-896-10	361	WHITE
P-46-3	P-806-8	361	BLACK
P-46-4	P-806-6	361	WHITE
P-46-5	P-806-4	361	BLACK
P-46-6	P-806-2	361	WHITE

(9) PLUB P-101 - 124-000310 (SINE FILTER #1)

FROM	TO	BOARD	COLOR
P-101-1	P-102-1 P-103-1	202 204	GREEN
P-101-2	P-102-2 P-103-2 GND STRIP	202 204	BLACK
P-101-3	EMPTY		
P-101-4	EMPTY		
P-101-5	EMPTY		
P-101-6	P-5-1	321	WHITE
P-101-7	P-5-2	321	GREEN
P-101-8	P-5-3	221	WHITE
P-101-9	EMPTY		
P-101-10	EMPTY		
P-101-11	P-102-9	202	WHITE
P-101-12	EMPTY		

(7) PLUG P-102 - 124-000202 (SINE FILTER #2)

FROM	TO	BOARD	COLOR
P-102-1	P-103-1 P-101-1	204 310	GREEN GREEN
P-102-2	P-103-2 P-101-2 GND STRIP	204 310	BLACK BLACK BLACK
P-102-3	P-103-4 P-828-12	204 P.S.	WHITE
P-102-4	P-5-4	321	GREEN
P-102-5	P-5-6	321	WHITE
P-102-6	P-5-8	321	GREEN
P-102-7	P-5-10	321	WHITE
P-102-8	+25 TERM. STRIP		GREEN
P-102-9	P-101-11	310	WHITE
P-102-10	EMPTY		
P-102-11	P-822-12 CABLE		
P-102-12	P-103-11	204	WHITE

FIGURE 3-38
PLUG & PIN NUMBER WIRING CHART
(PLUG #1 THRU P-102)

ES ORGAN (PLUG & PIN NOS.) SEE PHYSICAL LAYOUT

PLUG P-129 - 124-000351 (U/M PRESET) (PAGE 3-38)

	TO	BOARD	COLOR
	EMPTY		
2	P-6-9	321	BROWN
3	P-6-8	321	RED
4	P-6-7	321	ORANGE
5	P-6-6	321	YELLOW
6	P-6-3	321	GREEN
7	P-6-4	321	BLUE
8	P-6-2	321	PURPLE
9	P-6-5	321	GRAY
10	P-6-1	321	WHITE
11	P-7-1 P-821-8	321 321	ORANGE/WHITE ORANGE/WHITE
12	EMPTY		

PLUG J-143 - 124-000376 (MIXER #2 BOARD)

	TO	BOARD	COLOR
	TREMOLO UPPER TAB CONTACT #5		WHITE/BLUE
	J-144-8	376	WHITE/BLUE
	P-822-15		SHIELD
	BRILLIANCE TAB CONTACT #3		BLUE
	P-822-12		COAX #14
	P-822-8		SHIELD #13
	J-145-4	377	BLUE
	P-822-9		COAX #13
	TREMOLO UPPER TAB CONTACT $6		BLUE
10	TREMOLO LOWER TAB CONTACT #6		BLUE
11	TREMOLO LOWER TAB CONTACT #4		WHITE/BLUE
12	TREMOLO UPPER TAB CONTACT #4		WHITE/BROWN
13	J-145-16	377	RED/COAX #18
14	J-144-6	376	WHITE/BROWN

PLUG J-144 - 124-000376 (MIXER #1 BOARD)

	TO	BOARD	COLOR
	VOLUME SOFT TAB CONTACT #4		WHITE
	VOLUME SOFT TAB CONTACT #1		WHITE/BROWN
	J-145-22 J-126-9	377 425	DOUBLE GREEN
	EMPTY		
	P-822-8		SHIELD
	J-143-14	376	WHITE/BROWN
	P-822-7		COAX #12
	J-143-2	376	WHITE/BLUE
	P-823-12		COAX #15
0	J-106-20		WHITE/BLUE
1	EMPTY		
2	REVERB "I" TAB CONTACT #5		BLACK

(18) PLUG J-145 - 124-000377 (MIXER #3 BOARD)

FROM	TO	BOARD	COLOR
J-145-1	P-839-12		COAX #1
J-145-2	ACOUSTIC TREM. CHORUS TAB CONTACT #5		BLUE
J-145-3	EMPTY		
J-145-4	J-143-8	376	BLUE
J-145-5	P-839-1		COAX #2
J-145-6	EMPTY		
J-145-7	P-822-7		COAC #3
J-145-8	ACOUSTIC TREM. CHORUS TAB CONTACT #4		WHITE
J-145-9	P-839-6 REVERB "I" TAB CONTACT #1		COAX #4/red
J-145-10	REVERB "II" TAB CONTACT #4		WHITE
J-145-11	REVERB "II" TAB CONTACT #5		RED
J-145-12	EMPTY		
J-145-13	EMPTY		
J-145-14	J-143-15 SINGLE WIRE	376	DOUBLE BLACK
J-145-15	P-822-11		
J-145-16	J-143-13	376	RED
J-145-17	P-822-10		COAX #5
J-145-18	P-823-12		COAX #6
J-145-19	P-822-4		COAX #7
J-145-20	P-822-5		SHIELD
J-145-21	P-839-10		COAX #8
J-145-22	J-144-3 SINGLE WIRE	376	DOUBLE GREEN

(1) PLUG P-146 - 124-000265 (MOD GENERATOR BOARD)

FROM	TO	BOARD	COLOR
P-146-1	EMPTY		
P-146-2	P-821-4		BROWN
P-146-3	P-821-5		YELLOW
P-146-4	P-821-6		WHITE
P-146-5	P-821-7		BLUE
P-146-6	EMPTY		
P-146-7	P-7-2 GND. STRIP	321	BLACK BLACK
P-146-8	P-7-17 -14 TERM. STRIP	321	YELLOW/WHITE YELLOW/WHITE
P-146-9	P-7-18 -28 TERM. STRIP	321	PURPLE
P-146-10	EMPTY		
P-146-11	P-903-12 P-7-5	323 321	ORANGE ORANGE
P-146-12	P-903-11 P-7-6	323 321	RED RED
P-146-13	P-903-10 P-7-7	323 321	BROWN BROWN
P-146-14	P-903-9 P-7-4	323 321	YELLOW YELLOW
P-146-15	P-903-8 P-7-11	323 321	WHITE WHITE
P-146-16	P-903-7 P-7-10	323 321	GRAY GRAY
P-146-17	P-903-6 P-7-9	323 321	PURPLE PURPLE
P-146-18	P-903-5 P-7-8	323 321	BLUE BLUE
P-146-19	P-903-4 P-7-15	323 321	YELLOW YELLOW
P-146-20	P-903-3 P-7-14	323 321	ORANGE ORANGE
P-146-21	P-903-2 P-7-13	323 321	RED RED
P-146-22	P-903-1 P-7-12	323 321	BROWN BROWN
P-146-23	EMPTY		
P-146-24	EMPTY		

(13) PLUG P-147 - 124-000409 (REPEAT OSCILLAT

FROM	TO
P-147-1	J-147-7
P-147-2	EMPTY
P-147-3	REPEAT TAB CONTACT #4
P-147-4	J-126-2
P-147-5	J-125-6 P-821-14
P-147-6	EMPBY
P-147-7	J-147-1 P-836-17
P-147-8	REPEAT TAB CONTACT #6
P-147-9	P-823-6
P-147-10	EMPTY
P-147-11	SECOND VOICE TAB CONTACT
P-147-12	P-836-5
P-147-13	P-821-10 J-126-4
P-147-14	P-836-11
P-147-15	P-821-9
P-147-16	1) REPEAT TAB CONTACT #2 2) UNCONNECTED
P-147-17	REPEAT POT SIXED END
P-147-18	REPEAT POT WIPER
P-147-19	DELAYED VIBRATO TAB CON
P-147-20	J-125-3
P-147-21	SUSTAIN ON UPPER CONTACT
P-147-22	EMPTY

PLUG P-245 (PISTONS PRESETS)

FROM	TO
P-245-1	P-127-4
P-235-2	P-127-7
P-245-3	P-127-9
P-245-4	P-127-10
P-245-5	P-127-8
P-245-6	P-844-3
P-245-7	P-127-6
P-245-8	EMPTY
P-245-9	EMPTY

PLUG P-803 (LOWER MANUAL BOARD #1

OM	TO	BOARD	COLOR
803-1	P-905-1	323	RED
803-2	P-905-2	323	WHITE
803-3	P-905-3	323	RED
803-4	P-905-4	323	WHITE
803-5	P-905-5	323	RED
803-6	P-905-6	323	WHITE
803-7	P-905-7	323	RED
803-8	P-905-8	323	WHITE
803-9	P-905-9	323	RED
803-10	P-905-10	323	WHITE
803-11	P-905-11	323	RED
803-12	P-905-12	323	WHITE
803-13	P-905-13	323	RED
803-14	P-905-14	323	WHITE
803-15	P-905-15	323	RED
803-16	P-905-16	323	WHITE
803-17	EMPTY		
803-18	P-905-18	323	WHITE
803-19	P-905-19	323	RED
803-20	P-905-20 P-841-6	323 415	WHITE WHITE
803-21	P-905-21 P-841-10	323 415	RED RED
803-22	P-905-22 P-841-16	323 415	WHITE WHITE

PLUG P-804 (LOWER MANUAL BOARD #2)

ROM	TO	BOARD	COLOR
-804-1	P-907-1 P-841-13	323 415	RED RED
-804-2	P-907-2 P-841-15	323 415	WHITE WHITE
-804-3	P-907-3 P-841-11	323 415	RED RED
-804-4	P-907-4 P-841-7	323 415	WHITE WHITE
-805-5	P-907-5 P-841-3	323 415	RED RED
-804-6	P-907-6 P-841-5	323 415	WHITE WHITE
-804-7	P-907-7 P-841-4	323 415	RED RED
-804-8	P-907-8	323	WHITE
-804-9	P-907-9 P-841-8	323 415	RED RED
-804-10	P-907-10 P-841-2	323 415	WHITE WHITE
-804-11	P-907-11 P-841-22	323 415	RED RED
-804-12	P-907-12 P-841-18	323 415	WHITE WHITE
-804-13	P-907-13 P-841-20	323 415	RED RED
804-14	P-907-14 P-841-17	323 415	WHITE WHITE
804-15	P-907-15 P-841-21	323 415	RED RED
804-16	P-907-16 P-841-19	323 415	WHITE WHITE
804-17	EMPTY		
804-18	P-907-18	323	WHITE

FIGURE 3-40
PLUG & PIN NUMBER WIRING CHART
(PLUG #147 THRU P-804)

POINT TO POINT WIRING CHART OF 8200 SERIES ORGAN (PLUG & PIN NOS.)

SEE PHYSICAL LAYOUT (PAGE 3-38)

(8) PLUG P-103 - 124-000204 (SINE FILTER #3)

FROM	TO	BOARD	COLOR
P-103-1	P-102-1	202	GREEN
	P-101-1	310	GREEN
P-103-2	P-102-2	202	BLACK
	P-101-2	310	BLACK
	GND. STRIP		BLACK
P-103-3	EMPTY		
P-103-4	P-102-3	202	WHITE
	P-828-12	POWER SUPPLY	WHITE
P-103-5	P-5-5	321	GREEN
P-103-6	P-5-7	321	WHITE
P-103-7	P-5-9	321	GREEN
P-103-8	P-5-11	321	WHITE
P-103-9	P-5-12	321	GREEN
P-103-10	EMPTY		
P-103-11	P-102-12	202	WHITE
P-103-12	EMPTY		

(15) PLUG J-106-124-000208 (BRIGHT PERCUSSION BOARD)

FROM	TO	BOARD	COLOR
J-106-1	EMPTY		
J-106-2	J-126-15	425	RED
J-106-3	P-821-15		DOUBLE WHITE/GREEN
	PIANO SOLO TAB CONTACT #6		
J-106-4	J-15-9	425	RED
J-106-5	EMPTY		
J-106-6	EMPTY		
J-106-7	PIANO DIAPASON CONTACT #1		WHITE/VIOLET
J-106-8	HARPSICHORD TAB CONTACT #1		WHITE/VIOLET
J-106-9	EMPTY		
J-106-10	EMPTY		
J-106-11	EMPTY		
J-106-12	BANJO TAB CONTACT #1		WHITE/VIOLET
J-106-13	PIZZI II TAB CONTACT #4		WHITE/VIOLET
J-106-14	PIZZI I TAB CONTACT #4		WHITE/VIOLET
J-106-15	EMPTY		
J-106-16	EMPTY		
J-106-17	J-126-11	425	DOUBLE BLACK
	J-143-15	376	
J-106-18	EMPTY		
J-106-19	EMPTY		
J-106-20	J-144-10	376	WHITE/BLUE
J-106-21	J-126-8	425	WHITE/BLUE
J-106-22	EMPTY		

(14) PLUG J-125 - 124-000425 (UPPER MANUAL SYNTHESIS PERC. BOARD)

FROM	TO	BOARD	COLOR
J-125-1	SECOND VOICE CONTACT #2		DOUBLE BLACK
	SUSTAIN UPPER CONTACT #6		
J-125-2	P-147-20	409	BLUE
J-125-3	TAB "5" CONTACT #5		BLUE
J-125-4	TAB "2" CONTACT #6		BROWN
J-125-5	PERCUSSION FAST TAB CONTACT #5		BROWN
J-125-6	J-147-5	409	ORANGE
J-125-7	EMPTY		
J-125-8	SECOND VOICE TAB CONTACT #5		WHITE/RED
J-125-9	SECOND VOICE TAB CONTACT #3		ORANGE
J-125-10	J-106-4	208	RED
J-125-11	TWIN MALLET MARIMBA TAB CONTACT #5		RED
J-125-12	TWIN AMLLET MARIMBA TAB CONTACT #2		WHITE
J-125-13	REPEAT TAB CONTACT #1		WHITE
J-125-14	REPEAT TAB CONTACT #3		BLUE
J-125-15	PIANO SOLO TAB CONTACT #4		BLUE

(14) PLUG J-126 - 124-000425 (UPPER MANUAL SYNTHESIS PERC. BOARD)

FROM	TO	BOARD	COLOR
J-126-1	REPEAT TAB CONTACT #4		RED
J-126-2	BANJO TAB CONTACT #6		WHITE/BROWN
J-126-3	J-147-4	409	RED
J-126-4	P-147-13	409	RED
J-126-5	P836-11	326	DOUBLE VIOLET
	VIBRATO II TAB CONTACT #5		
J-126-6	P-821-4		DOUBLE BROWN
	VIBRATO I TAB CONTACT #6		
J-126-7	P-836-17	326	DOUBLE YELLOW
	SUSTAIN UPPER TAB CONTACT #2		
J-126-8	P-837-2	326	DOUBLE WHITE/BLUE
	J-106-21	208	
J-126-9	J-144-3	376	GREEN
J-126-10	P-842-3		WHITE/ORANGE
J-126-11	J-106-17	208	BLACK
J-126-12	PIZZI. I (OBOE)CONTACT #5		WHITE/ORANGE
J-126-13	EMPTY		
J-126-14	PIANO(DIAPASON)CONTACT #2		RED
J-126-15	J-106-2	208	RED

(10) PLUG P-127 - 124-000351 (U/M PRESET)

FROM	TO	BOARD	COLOR
P-127-1	P-845-1		RED
P-127-2	P-845-3		BLUE
P-127-3	P-844-1		ORANGE
P-127-4	P-245-1	PISTONS	BROWN
P-127-5	DRAWBAR DIVIDER RESISTOR		GREEN/WHITE
P-127-6	P-245-7	PISTONS	RED
P-127-7	P-245-2	PISTONS	PURPLE
P-127-8	P-245-5	PISTONS	YELLOW
P-127-9	P-245-3	PISTONS	GREEN
P-127-10	P-245-4	PISTONS	BLUE
P-127-11	SUSTAIN BUS U/M TONEBARS		BLACK/WHITE
P-127-1	1' TONEBAR		WHITE
P-127-13	1-1/3' TONEBAR		GRAY
P-127-14	1-3/5' TONEBAR		PURPLE
P-127-15	2' TONEBAR		BLUE
P-127-16	2-2/3' TONEBAR		GREEN
P-127-17	4' TONEBAR		YELLOW
P-127-18	8' TONEBAR		ORANGE
P-127-19	5-1/3' TONEBAR		RED
P-127-20	16' TONEBAR		BROWN
P-127-21	EMPTY		
P-127-22	EMPTY		

(10) PLUG P-128 - 124-000351 (U/M PRESET)

FROM	TO	BOARD	COLOR
P-128-1	P-809-3	361	BLACK
	GRND. STRIP		BLACK
P-128-2	-28 TERM. STRIP		PURPLE
P-128-3	P-820-1		BROWN
P-128-4	P-820-2		RED
P-128-5	P-820-3		BLUE
P-128-6	P-820-4		YELLOW
P-128-7	P-820-5		ORANGE
P-128-8	P-820-6		BLACK/WHITE
P-128-9	P-820-7		PURPLE/WHITE
P-128-10	P-820-8		RED/WHITE
P-128-11	P-809-8	361	YELLOW/WHITE
P-128-12	EMPTY		

(10) PLUG P-129 - 124-000351 (U/M PRESET)

FROM	TO	BOARD	COLOR
P-129-1	EMPTY		
P-129-2	P-6-9	321	BROWN
P-129-3	P-6-8	321	RED
P-129-4	P-6-7	321	ORANGE
P-129-5	P-6-6	321	YELLOW
P-129-6	P-6-3	321	GREEN
P-129-7	P-6-4	321	BLUE
P-129-8	P-6-2	321	PURPLE
P-129-9	P-6-5	321	GRAY
P-129-10	P-6-1	321	WHITE
P-129-11	P-7-1	321	ORANGE/WHITE
	P-821-8	321	ORANGE/WHITE
P-129-12	EMPTY		

(17) PLUG J-143 - 124-000376 (MIXER #2 BOARD)

FROM	TO	BOARD	COLOR
J-143-1	TREMOLO UPPER TAB CONTACT #5		WHITE/BLUE
J-143-3	J-144-8	376	WHITE/BLUE
J-143-3	P-822-15		SHIELD
J-143-4	BRILLIANCE TAB CONTACT #3		BLUE
J-143-5	P-822-12		COAX #14
J-143-6	P-822-8		SHIELD #13
J-143-7	J-145-4	377	BLUE
J-143-8	P-822-9		COAX #13
J-143-9	TREMOLO UPPER TAB CONTACT $6		BLUE
J-143-10	TREMOLO LOWER TAB CONTACT #6		BLUE
J-143-11	TREMOLO LOWER TAB CONTACT #4		WHITE/BLUE
J-143-12	TREMOLO UPPER TAB CONTACT #4		WHITE/BROWN
J-143-13	J-145-16	377	RED/COAX #18
J-143-14	J-144-6	376	WHITE/BROWN

(17) PLUG J-144 - 124-000376 (MIXER #1 BOARD)

FROM	TO	BOARD	COLOR
J-144-1	VOLUME SOFT TAB CONTACT #4		WHITE
J-144-2	VOLUME SOFT TAB CONTACT #1		WHITE/BROWN
J-144-3	J-145-22	377	DOUBLE GREEN
	J-126-9	425	
J-144-4	EMPTY		
J-144-5	P-822-8		SHIELD
J-144-6	J-143-14	376	WHITE/BROWN
J-144-7	P-822-7		COAX #12
J-144-8	J-143-2	376	WHITE/BLUE
J-144-9	P-823-12		COAX #15
J-144-10	J-106-20		WHITE/BLUE
J-144-11	EMPTY		
J-144-12	REVERB "I" TAB CONTACT #5		BLACK

(18) PLUG J-145 - 124-000377 (MIXER #3 BOARD)

FROM	TO	BOARD	COLOR
J-145-1	P-839-12		COAX #1
J-145-2	ACOUSTIC TREM. CHORUS TAB CONTACT #5		BLUE
J-145-3	EMPTY		
J-145-4	J-143-8	376	BLUE
J-145-5	P-839-1		COAX #2
J-145-6	EMPTY		
J-145-7	P-822-7		COAC #3
J-145-8	ACOUSTIC TREM. CHORUS TAB CONTACT #4		WHITE
J-145-9	P-839-6		COAX #4/red
	REVERB "I" TAB CONTACT #1		
J-145-10	REVERB "II" TAB CONTACT #4		WHITE
J-145-11	REVERB "II" TAB CONTACT #5		RED
J-145-12	EMPTY		
J-145-13	EMPTY		
J-145-14	J-143-15	376	DOUBLE BLACK
	SINGLE WIRE		
J-145-15	P-822-11		
J-145-16	J-143-13	376	RED
J-145-17	P-822-10		COAX #5
J-145-18	P-823-12		COAX #6
J-145-19	P-822-4		COAX #7
J-145-20	P-822-5		SHIELD
J-145-21	P-839-10		COAX #8
J-145-22	J-144-3	376	DOUBLE GREEN
	SINGLE WIRE		

(1) PLUG P-146 - 124-000265 (MDD GENERATOR BOARD)

FROM	TO	BOARD	COLOR
P-146-1	EMPTY		
P-146-2	P-821-4		BROWN
P-146-3	P-821-5		YELLOW
P-146-4	P-821-6		WHITE
P-146-5	P-821-7		BLUE
P-146-6	EMPTY		
P-146-7	P-7-2	321	BLACK
	GND. STRIP		BLACK
P-146-8	P-7-17	321	YELLOW/WHITE
	-14 TERM. STRIP		YELLOW/WHITE
P-146-9	P-7-18	321	PURPLE
	-28 TERM. STRIP		
P-146-10	EMPTY		
P-146-11	P-903-12	323	ORANGE
	P-7-5	321	ORANGE
P-146-12	P-903-11	323	RED
	P-7-6	321	RED
P-146-13	P-903-10	323	BROWN
	P-7-7	321	BROWN
P-146-14	P-903-9	323	YELLOW
	P-7-4	321	YELLOW
P-146-15	P-903-8	323	WHITE
	P-7-11	321	WHITE
P-146-16	P-903-7	323	GRAY
	P-7-10	321	GRAY
P-146-17	P-903-6	323	PURPLE
	P-7-9	321	PURPLE
P-146-18	P-903-5	323	BLUE
	P-7-8	321	BLUE
P-146-19	P-903-4	323	YELLOW
	P-7-15	321	YELLOW
P-146-20	P-903-3	323	ORANGE
	P-7-14	321	ORANGE
P-146-21	P-903-2	323	RED
	P-7-13	321	RED
P-146-22	P-903-1	323	BROWN
	P-7-12	321	BROWN
P-146-23	EMPTY		
P-146-24	EMPTY		

FIGURE 3-39
PIN & PLUG NUMBER WIRING CHART
(PLUG #103 THRU P-146)

POINT TO POINT WIRING CHART OF 8200 SERIES ORGAN (PLUG & PIN NOS)

SEE PHYSICAL LAYOUT (PAGE 3-38)

13 PLUG P-147 - 124-000409 (REPEAT OSCILLATOR & DETECTOR BOARD)

FROM	TO	BOARD	COLOR
P-147-1	J-147-7	409	WHITE/YELLOW
P-147-2	EMPTY		
P-147-3	REPEAT TAB CONTACT #4		RED
P-147-4	J-126-2	425	RED
P-147-5	J-125-6 P-821-14	425	DOUBLE ORANGE
P-147-6	EMPBY		
P-147-7	J-147-1 P-836-17	409 326	DOUBLE WHITE/YELLOW
P-147-8	REPEAT TAB CONTACT #6		WHITE/GRAY
P-147-9	P-823-6		WHITE/GRAY
P-147-10	EMPTY		
P-147-11	SECOND VOICE TAB CONTACT #1		YELLOW
P-147-12	P-836-5	326	YELLOW
P-147-13	P-821-10 J-126-4	425	DOUBLE RED
P-147-14	P-836-11	326	VIOLET
P-147-15	P-821-9		RED
P-147-16	1) REPEAT TAB CONTACT #2 2) UNCONNECTED		BLACK SHIELD
P-147-17	REPEAT POT SIXED END		RED
P-147-18	REPEAT POT WIPER		BLUE
P-147-19	DELAYED VIBRATO TAB CONTACT #5		COAX #9
P-147-20	J-125-3	425	BLUE
P-147-21	SUSTAIN ON UPPER CONTACT #1		BLUE
P-147-22	EMPTY		

PLUG P-245 (PISTONS PRESETS)

FROM	TO	BOARD	COLOR
P-245-1	P-127-4	351	BROWN
P-235-2	P-127-7	351	PURPLE
P-245-3	P-127-9	351	GREEN
P-245-4	P-127-10	351	BLUE
P-245-5	P-127-8	351	YELLOW
P-245-6	P-844-3		GREEN/WHITE
P-245-7	P-127-6	351	RED
P-245-8	EMPTY		
P-245-9	EMPTY		

PLUG P-801 (UPPER MANUAL BOARD #1)

FROM	TO	BOARD	COLOR
P-801-1	P-818-1 P-811-23	ARP 375	BLUE BLUE
P-801-2	P-818-2 P-811-22	ARP 375	WHITE WHITE
P-801-3	P-818-3 P-811-21	ARP 375	BLUE BLUE
P-801-4	P-818-4 P-811-20	ARP 375	WHITE WHITE
P-801-5	P-818-5 P-811-19	ARP 375	BLUE BLUE
P-801-6	P-818-6 P-811-18	ARP 375	WHITE WHITE
P-801-7	P-818-7 P-811-17	ARP 375	BLUE BLUE
P-801-8	P-81124	375	WHITE
P-801-9	P-818-8 P-811-16	ARP 375	BLUE BLUE
P-801-10	P-818-9 -811-15	ARP 375	WHITE WHITE
P-801-11	P-818-10 P-811-14	ARP 375	BLUE BLUE
P-801-12	P-818-11 P-811-13	ARP 375	WHITE WHITE
P-801-13	P-818-12 P-811-12	ARP	BLUE BLUE
P-801-14	P-818-13 P-811-11	ARP 375	WHITE WHITE
P-801-15	P-818-14 P-811-10	ARP 375	BLUE BLUE
P-801-16	P-818-15 P-811-9	ARP	WHITE
P-801-17	EMPTY		
P-801-18	P-817-1 P-811-8	ARP	BLUE
P-801-19	P-817-2 P-811-7	ARP 375	WHITE WHITE
P-801-20	P-817-3 P-811-6	ARP 375	BLUE BLUE
P-801-21	P-817-4 P-811-5	ARP 375	WHITE WHITE
P-801-22	P-817-5 P-811-4	ARP 375	BLUE BLUE
P-801-23	P-817-6 P-811-3	ARP 375	WHITE WHITE
P-801-24	P-817-7 P-811-2	ARP 375	BLUE BLUE

PLUG P-802 (UPPER MANUAL BOARD #2)

FROM	TO	BOARD	COLOR
P-802-1	P-817-8 P-813-23	ARP 364	BLUE BLUE
P-802-2	P-817-9 P=813-22	ARP 364	WHITE WHITE
P-802-3	P-817-10 P-813-21	ARP 364	BLUE BLUE
P-802-4	P-817-11 P-813-20	ARP 364	WHITE WHITE
P-802-5	P-817-12 P-813-19	ARP 364	BLUE BLUE
P-802-6	P-817-13 P-813-18	ARP 364	WHITE WHITE
P-802-7	P-817-14 P-813-17	ARP 364	BLUE BLUE
P-802-8	P-813-24	364	WHITE
P-802-9	P-817-15 P-813-16	ARP 364	BLUE BLUE
P-802-10	P-816-1 P-813-15	ARP 364	WHITE WHITE
P-802-11	P-816-2 P-813-14	ARP 364	BLUE BLUE
P-802-12	P-816-3 P-813-13	ARP 364	WHITE WHITE
P-802-13	P-816-4 P-813-12	ARP 364	BLUE BLUE
P-802-14	P-816-5 P-813-11	ARP 364	WHITE WHITE
P-802-15	P-816-6 P-813-10	ARP 364	BLUE BLUE
P-802-16	P-816-7 P-813-9	ARP 364	WHITE WHITE
P-802-17	EMPTY		
P-802-18	P-816-8 P-813-8	ARP 364	BLUE BLUE
P-802-19	P-816-9 P-813-7	ARP 364	WHITE WHITE
P-802-20	P-816-10 P-813-6	ARP 364	BLUE BLUE
P-802-21	P-816-11 P-813-5	ARP 364	WHITE WHITE
P-802-22	P-816-12 P-813-4	ARP 364	BLUE BLUE
P-802-23	P-816-13 P-813-3	ARP 364	WHITE WHITE
P-802-24	P-816-14 P-813-2	ARP 364	BLUE BLUE

PLUG P-804 (LOWER MANUAL BOARD #2 CONTINUED)

FROM	TO	BOARD	COLOR
P-804-19	P-907-19	323	RED
P-804-20	P-907-20	323	WHITE
P-804-21	P-907-21	323	RED
P-804-22	P-907-22	323	WHITE
P-804-23	P-907-23	323	RED
P-804-24	P-907-24	323	WHITE

PLUG P-803 (LOWER MANUAL BOARD #1

FROM	TO	BOARD	COLOR
P-803-1	P-905-1	323	RED
P-803-2	P-905-2	323	WHITE
P-803-3	P-905-3	323	RED
P-803-4	P-905-4	323	WHITE
P-803-5	P-905-5	323	RED
P-803-6	P-905-6	323	WHITE
P-803-7	P-905-7	323	RED
P-803-8	P-905-8	323	WHITE
P-803-9	P-905-9	323	RED
P-803-10	P-905-10	323	WHITE
P-803-11	P-905-11	323	RED
P-803-12	P-905-12	323	WHITE
P-803-13	P-905-13	323	RED
P-803-14	P-905-14	323	WHITE
P-803-15	P-905-15	323	RED
P-803-16	P-905-16	323	WHITE
P-803-17	EMPTY		
P-803-18	P-905-18	323	WHITE
P-803-19	P-905-19	323	RED
P-803-20	P-905-20 P-841-6	323 415	WHITE WHITE
P-803-21	P-905-21 P-841-10	323 415	RED RED
P-803-22	P-905-22 P-841-16	323 415	WHITE WHITE

PLUG P-804 (LOWER MANUAL BOARD #2)

FROM	TO	BOARD	COLOR
P-804-1	P-907-1 P-841-13	323 415	RED RED
P-804-2	P-907-2 P-841-15	323 415	WHITE WHITE
P-804-3	P-907-3 P-841-11	323 415	RED RED
P-804-4	P-907-4 P-841-7	323 415	WHITE WHITE
P-805-5	P-907-5 P-841-3	323 415	RED RED
P-804-6	P-907-6 P-841-5	323 415	WHITE WHITE
P-804-7	P-907-7 P-841-4	323 415	RED RED
P-804-8	P-907-8	323	WHITE
P-804-9	P-907-9 P-841-8	323 415	RED RED
P-804-10	P-907-10 P-841-2	323 415	WHITE WHITE
P-804-11	P-907-11 P-841-22	323 415	RED RED
P-804-12	P-907-12 P-841-18	323 415	WHITE WHITE
P-804-13	P-907-13 P-841-20	323 415	RED RED
P-804-14	P-907-14 P-841-17	323 415	WHITE WHITE
P-804-15	P-907-15 P-841-21	323 415	RED RED
P-804-16	P-907-16 P-841-19	323 415	WHITE WHITE
P-804-17	EMPTY		
P-804-18	P-907-18	323	WHITE

FIGURE 3-40
PLUG & PIN NUMBER WIRING CHART
(PLUG #147 THRU P-804)

RGAN (PLUG & PIN NOS.)

SEE PHYSICAL LAYOUT
(PAGE 3-38)

G 812 - 124-000364 (PERCUSSION KEYING)

TO	BOARD	COLOR
EMPTY		
P-3-13	321	VIOLET
P-3-5	321	YELLOW
P-2-19	321	VIOLET
P-2-11	321	YELLOW
P-2-3	321	VIOLET
P-1-17	321	YELLOW
P-1-9	321	VIOLET
P-1-1	321	YELLOW
P-4-19	321	VIOLET
P-4-13	321	YELLOW
P-4-7	321	VIOLET
P-4-1	321	YELLOW
P-3-17	321	VIOLET
P-3-9	321	YELLOW
P-3-1	321	VIOLET
P-2-15	321	YELLOW
P-2-7	321	VIOLET
P-1-21	321	YELLOW
P-1-13	321	VIOLET
P-1-5	321	YELLOW
P-4-17	321	VIOLET
P-4-11	321	YELLOW
EMPTY		

G P-814 - 124-000375 (PERCUSSION KEYER)

TO	BOARD	COLOR
P-815-1	364	BLACK
GND. STRIP		BLACK
P-815-2	364	GREEN/WHITE
P-821-11		GREEN/WHITE
P-815-3	364	GRAY
P-821-13		GRAY
P-815-4	364	BROWN
P-821-12		BROWN
P-815-5	364	RED
P-821-10		RED
P-815-6	364	BLUE/W
P-821-9		BLUE/W

S P-815 - 124-000364 (PERCUSSION KEYER)

TO	BOARD	COLOR
P-814-1	374	BLACK
GND. STRIP		BLACK
P-814-2	375	GREEN/WHITE
P-821-11		GREEN/WHITE
P-814-3	375	GRAY
P-821-13		GRAY
P-814-4	375	BROWN
P-821-12		BROWN
P-814-5	374	RED
P-821-10		RED
P-814-6	375	BLUE/WHITE
P-821-9		BLUE/WHITE

PLUG P-816 (ARPEGGIATOR ASSEMBLY)

FROM	TO	BOARD	COLOR
P-816-1	P-802-10		WHITE
P-816-2	P-802-11		BLUE
P-816-3	P-802-12		WHITE
P-816-4	P-802-13		BLUE
P-816-5	P-802-14		WHITE
P-816-6	P-802-15		BLUE
P-816-7	P-802-16		WHITE
P-816-8	P-802-18		BLUE
P-816-9	P-802-19		WHITE
P-816-10	P-802-20		BLUE
P-816-11	P-802-21		WHITE
P-816-12	P-802-22		BLUE
P-816-13	P-802-23		WHITE
P-816-14	P-802-24		BLUE

PLUG P-817 (ARPEGGIATOR ASSEMBLY)

FROM	TO	BOARD	ASSEMBLY
P-817-1	P-801-18		BLUE
P-817-2	P-801-19		WHITE
P-817-3	P-801-20		BLUE
P-817-4	P-801-21		WHITE
P-817-5	P-801-22		BLUE
P-817-6	P-801-23		WHITE
P-817-7	P-801-24		BLUE
P-817-8	P-802-1		BLUE
P-817-9	P-802-2		WHITE
P-817-10	P-802-3		BLUE
P-817-11	P-802-4		WHITE
P-817-12	P-802-5		BLUE
P-817-13	P-802-6		WHITE
P-817-14	P-802-7		BLUE
P-817-15	P-802-9		BLUE

PLUG P-818 (ARPEGGIATOR ASSEMBLY)

FROM	TO	BOARD	COLOR
P-818-1	P-801-1		BLUE
P-818-2	P-801-2		WHITE
P-818-3	P-801-3		BLUE
P-818-4	P-801-4		WHITE
P-818-5	P-801-5		BLUE
P-818-6	P-801-6		WHITE
P-818-7	P-801-7		BLUE
P-818-8	P-801-9		BLUE
P-818-9	P-801-10		WHITE
P-818-10	P-801-11		BLUE
P-818-11	P-801-12		WHITE
P-818-12	P-801-13		BLUE
P-818-13	P-801-14		WHITE
P-818-14	P-801-15		BLUE
P-818-15	P-801-16		WHITE

PLUG P-819 (ARPEGGIATOR AS

FROM	TO
P-819-1	P-840-4
P-819-2	P-840-3
P-819-3	P-840-5
P0819-4	P-840-1
P-819-5	P-840-12
P-819-6	P-840-8
P-819-7	P-840-10
P-819-8	P-840-9
P-819-9	P-840-11
P-819-10	P-840-7
P-819-11	P-840-6
P-819-12	P-840-2
P-819-13	EMPTY
P-819-14	EMPTY
P-819-15	EMPTY

PLUG -820

FROM	TO
P-820-1	P-128-3
P-820-2	P-128-4
P-820-3	P-128-5
P-820-4	P-128-6
P-820-5	P-128-7
P-820-6	P-128-8
P-820-7	P-128-9
P-820-8	P-128-10
P-820-9	P-809-2
P-820-10	
P-820-11	P-809-6
P-820-12	P-809-5
P-820-13	P-809-7
P-820-14	P-843-3
P-820-15	P-843-1

PLUG P-820

FROM	TO
P-820-1	TAB "3" CO
P-820-2	TABE "2" C
P-820-3	TWIN MALLE
P-820-4	TWIN MALLE
P-820-5	GLOCK TAB
P-820-6	TWIN MALLE
P-820-7	TAB "5" CO
P-820-8	TWIN MALLE
P-820-9	P-836-18
P-820-10	P-837-6
P-820-11	P-837-1
P-820-12	P-836-15
P-820-13	P-836-14
P-820-14	P-837-14
P-820-15	P-837-15

-825 (POWER AMP)

TO	BOARD	COLOR
P-826-1	POWER SUPPLY	RED
P-828-5	POWER SUPPLY	RED
P-826-2	POWER SUPPLY	ORANGE
P-828-4	POWER SUPPLY	ORANGE
CASSETTE TERM. STRIP		BROWN
EMPTY		
GROUND STRAP		HEAVY BLACK
EMPTY		
EMPTY		
P-839-9		SHIELD
P-839-12		CABLE

P-826 (POWER AMP)

TO	BOARD	COLOR
P-825-1	POWER SUPPLY	RED
P-828-5	POWER SUPPLY	RED
P-825-2	POWER SUPPLY	ORANGE
P-828-4	POWER SUPPLY	ORANGE
CASSETTE TERM. STRIP		WHITE
EMPTY		
GROUND STRAP		HEAVY BLACK
EMPTY		
EMPTY		
P-839-7		SHIELD
P-839-10		CABLE

-827 (POWER SUPPLY)

TO	BOARD	COLOR
P-838-1	LESLIE	HEAVY BLUE
ON/OFF SWITCH PIN 2		HEAVY BLUE
ON/OFF SWITCH PIN 3		HEAVY YELLOW
ON/OFF SWITCH PIN 1		HEAVY GRAY
P-838-5	LESLIE	HEAVY BROWN
P-838-4	LESLIE	HEAVY GRAY
P-824-1		HEAVY YELLOW
P-824-4		HEAVY BROWN
P-838-3	LESLIE	RED
CASSETTE TERM. STRIP		RED
SPEAKER		LIGHT GREEN
CASSETTE TERM. STRIP		DARK GREEN
P-838-2		HEAVY YELLOW
PLUGS IN P-822-3		BROWN

-828 (POWER AMP)

TO	BOARD	COLOR
SPEAKER		BLACK
P-822-5		SHIELD
P-822-4		CABLE
P-825-2	POWER SUPPLY	ORANGE
P-826-2	POWER AMP.	ORANGE
P-825-1	POWER SUPPLY	RED
P-826-1	POWER AMP.	RED
EMPTY		
P-834-3	166	GREEN
+25 TERM. STRIP		GREEN
EMPTY		
GRD.STRAP BELOW TWEETED		HEAVY BLACK
-28 TERM. STRIP		PURPLE
EMPTY		
EMPTY		
CASSETTE TERM. STRIP		YELLOW
P-832-14	SWELL PEDAL	WHITE
-24V TERM. STRIP		YELLOW/WHITE

FIGURE 3-42
PLUG & PIN NUMBER WIRING CHART
(PLUG #819 THRU P-828)

POINT TO POINT WIRING CHART OF 8200 SERIES ORGAN (PLUG & PIN NOS.)

SEE PHYSICAL LAYOUT (PAGE 3-38)

(6) PLUG P-805 124-000362 (L/M BUS AMP)

FROM	TO	BOARD	COLOR
P-805-1	P-842-1		BROWN
P-805-2	P-842-3		ORANGE/WHITE
P-805-3	+25 TERM. STRIP		GREEN
P-805-4	P-842-2		GRAY
P-805-5	L/M TONEBAR 8' (GREEN)		BROWN
P-805-6	L/M TONEBAR 8' (YELLOW)		RED
P-805-7	L/M TONEBAR 4' (GREEN)		ORANGE
P-805-8	L/M TONEBAR 4' (YELLOW)		YELLOW
P-805-9	L/M TONEBAR 2' (GREEN)		GREEN
P-805-10	L/M TONEBAR 2' (YELLOW)		BLUE
P-805-11	L/M TONEBAR 1' (GREEN)		PURPLE
P-805-12	GROUND STRAP		BLACK
P-805-13	EMPTY		
P-805-14	-14 TERM. STRIP		YELLOW/WHITE
P-805-15	-28 TERM. STRIP		PURPLE

(11) PLUG P-806 - 124-000361 (PEDAL GATE)

FROM	TO	BOARD	COLOR
P-806-1	P-906-11	323	BLACK
P-806-2	P-46-6	321	WHITE
P-806-3	P-906-12	323	WHITE
P-806-4	P-46-5	321	BLACK
P-806-5	P-906-4	323	BLACK
P-806-6	P-46-4	321	WHITE
P-806-7	P-906-7	323	WHITE
P-806-8	P-46-3	321	BLACK
P-806-9	P-906-10	323	BLACK
P-806-10	P-46-2	321	WHITE
P-806-11	P-906-13	323	WHITE
P-806-12	P-46-1	321	BLACK
P-806-13	P-906-2	323	WHITE
P-806-14	GND. STRIP		BLACK
P-806-15	EMPTY		

(11) PLUG P-807 - 124-000361 (PEDAL GATE)

FROM	TO	BOARD	COLOR
P-807-1	P-906-1	323	BLACK
P-807-2	P-45-6	321	WHITE
P-807-3	P-906-3	323	WHITE
P-807-4	P-45-5	321	BLACK
P-807-5	P-906-5	323	BLACK
P-807-6	P-45-4	321	WHITE
P-807-7	P-906-6	323	WHITE
P-807-8	P-45-3	321	BLACK
P-807-9	P-906-8	323	BLACK
P-807-10	P-45-2	321	WHITE
P-807-11	P-906-9	323	WHITE
P-807-12	P-45-1	321	BLACK

FIGURE 3-41
PIN & PLUG NUMBER WIRING CHART
(PLUG #805 THRU P-818)

(11) PLUG P-808 - 124-000361 (PEDAL GATE)

FROM	TO	BOARD	COLOR
P-808-1	P-833-14		BLACK
P-808-2	P-833-1		BROWN
P-808-3	P-833-2		RED
P-808-4	P-833-3		ORANGE
P-808-5	P-833-4		YELLOW
P-808-6	P-833-5		GREEN
P-808-7	P-833-6		BLUE
P-808-8	P-833-7		PURPLE
P-808-9	P-833-8		GRAY
P-808-10	P-833-9		WHITE
P-808-11	P-833-10		BLACK/WHITE
P-808-12	P-833-11		BROWN/WHITE
P-808-13	P-833-12		RED/WHITE
P-808-14	P-833-13		ORANGE/WHITE
P-808-15	P-833-15		YELLOW/WHITE

(11) PLUG P-809 - 124-000361 (PEDAL GATE)

FROM	TO	BOARD	COLOR
P-809-1	EMPTY		
P-809-2	P-820-9		ORANGE/WHITE
P-809-3	P-128-1 GND. STRAP	351	BLACK BLACK
P-809-4	EMPTY		
P-809-5	P-820-12		GREEN/WHITE
P-809-6	P-820-11		CABLE
P-809-7	P-820-13		BLUE/WHITE
P-809-8	P-128-11	351	YELLOW/WHITE
P-809-9	-14 TERM. STRIP		YELLOW/WHITE
P-809-10	EMPTY		
P-809-11	EMPTY		
P-809-12	EMPTY		

(5) P-810 - 124-000375 (PERCUSSION KEYING)

FROM	TO	BOARD	COLOR
P-810-1	EMPTY		
P-810-2	P-4-5	321	YELLOW
P-810-3	P-3-21	321	VIOLET
P-810-4	P-3-15	321	YELLOW
P-810-5	P-3-7	321	VIOLET
P-810-6	P-2-21	321	YELLOW
P-810-7	P-2-13	321	VIOLET
P-810-8	P-2-5	321	YELLOW
P-810-10	P-1-19	321	VIOLET
P-810-10	P-1-11	321	YELLOW
P-810-11	P-1-3	321	VIOLET
P-810-12	P-4-21	321	YELLOW
P-810-13	P-4-15	321	VIOLET
P-810-14	P-4-9	321	YELLOW
P-810-15	P-4-3	321	VIOLET
P-810-16	P-3-19	321	YELLOW
P-810-17	P-3-11	321	VIOLET
P-810-18	P-3-3	321	YELLOW
P-810-19	P-2-17	321	VIOLET
P-810-20	P-2-9	321	YELLOW
P-810-21	P-2-1	321	VIOLET
P-810-22	P-1-15	321	YELLOW
P-810-23	P-1-7	321	VIOLET
P-810-24	EMPTY		

(4) PLUG 812 - 124-000364 (PERCUSSION KEYING)

FROM	TO	BOARD	COLOR
P-812-1	EMPTY		
P-812-2	P-3-13	321	VIOLET
P-812-3	P-3-5	321	YELLOW
P-812-4	P-2-19	321	VIOLET
P-812-5	P-2-11	321	YELLOW
P-812-6	P-2-3	321	VIOLET
P-812-7	P-1-17	321	YELLOW
P-812-8	P-1-9	321	VIOLET
P-812-9	P-1-1	321	YELLOW
P-812-10	P-4-19	321	VIOLET
P-812-11	P-4-13	321	YELLOW
P-812-12	P-4-7	321	VIOLET
P-812-13	P-4-1	321	YELLOW
P-812-14	P-3-17	321	VIOLET
P-812-15	P-3-9	321	YELLOW
P-812-16	P-3-1	321	VIOLET
P-812-17	P-2-15	321	YELLOW
P-812-18	P-2-7	321	VIOLET
P-812-19	P-1-21	321	YELLOW
P-812-20	P-1-13	321	VIOLET
P-812-21	P-1-5	321	YELLOW
P-812-22	P-4-17	321	VIOLET
P-812-23	P-4-11	321	YELLOW
P-812-24	EMPTY		

(5) PLUG P-814 - 124-000375 (PERCUSSION KEYER)

FROM	TO	BOARD	COLOR
P-814-1	P-815-1 GND. STRIP	364	BLACK BLACK
P-814-2	P-815-2 P-821-11	364	GREEN/WHITE GREEN/WHITE
P-814-3	P-815-3 P-821-13	364	GRAY GRAY
P-814-4	P-815-4 P-821-12	364	BROWN BROWN
P-814-5	P-815-5 P-821-10	364	RED RED
P-814-6	P-815-6 P-821-9	364	BLUE/W BLUE/W

(4) PLUG P-815 - 124-000364 (PERCUSSION KEYER)

FROM	TO	BOARD	COLOR
P-815-1	P-814-1 GND. STRIP	374	BLACK BLACK
P-815-2	P-814-2 P-821-11	375	GREEN/WHITE GREEN/WHITE
P-815-3	P-814-3 P-821-13	375	GRAY GRAY
P-815-4	P-814-4 P-821-12	375	BROWN BROWN
P-815-5	P-814-5 P-821-10	374	RED RED
P-815-6	P-814-6 P-821-9	375	BLUE/WHITE BLUE/WHITE

PLUG P-816 (ARPEGGIATOR ASSEMBLY)

FROM	TO	BOARD	COLOR
P-816-1	P-802-10		WHITE
P-816-2	P-802-11		BLUE
P-816-3	P-802-12		WHITE
P-816-4	P-802-13		BLUE
P-816-5	P-802-14		WHITE
P-816-6	P-802-15		BLUE
P-816-7	P-802-16		WHITE
P-816-8	P-802-18		BLUE
P-816-9	P-802-19		WHITE
P-816-10	P-802-20		BLUE
P-816-11	P-802-21		WHITE
P-816-12	P-802-22		BLUE
P-816-13	P-802-23		WHITE
P-816-14	P-802-24		BLUE

PLUG P-817 (ARPEGGIATOR ASSEMBLY)

FROM	TO	BOARD	ASSEMBLY
P-817-1	P-801-18		BLUE
P-817-2	P-801-19		WHITE
P-817-3	P-801-20		BLUE
P-817-4	P-801-21		WHITE
P-817-5	P-801-22		BLUE
P-817-6	P-801-23		WHITE
P-817-7	P-801-24		BLUE
P-817-8	P-802-1		BLUE
P-817-9	P-802-2		WHITE
P-817-10	P-802-3		BLUE
P-817-11	P-802-4		WHITE
P-817-12	P-802-5		BLUE
P-817-13	P-802-6		WHITE
P-817-14	P-802-7		BLUE
P-817-15	P-802-9		BLUE

PLUG P-818 (ARPEGGIATOR ASSEMBLY)

FROM	TO	BOARD	COLOR
P-818-1	P-801-1		BLUE
P-818-2	P-801-2		WHITE
P-818-3	P-801-3		BLUE
P-818-4	P-801-4		WHITE
P-818-5	P-801-5		BLUE
P-818-6	P-801-6		WHITE
P-818-7	P-801-7		BLUE
P-818-8	P-801-9		BLUE
P-818-9	P-801-10		WHITE
P-818-10	P-801-11		BLUE
P-818-11	P-801-12		WHITE
P-818-12	P-801-13		BLUE
P-818-13	P-801-14		WHITE
P-818-14	P-801-15		BLUE
P-818-15	P-801-16		WHITE

POINT TO POINT WIRING CHART OF 8200 SERIES ORGAN (PLUG & PIN NOS.) SEE PHYSICAL LAYOUT

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PLUG P-819 (ARPEGGIATOR ASSEYBLY)

FROM	TO	BOARD	COLOR
P-819-1	P-840-4		BLUE
P-819-2	P-840-3		WHITE
P-819-3	P-840-5		WHITE
P0819-4	P-840-1		WHITE
P-819-5	P-840-12		BLUE
P-819-6	P-840-8		BLUE
P-819-7	P-840-10		BLUE
P-819-8	P-840-9		WHITE
P-819-9	P-840-11		WHITE
P-819-10	P-840-7		WHITE
P-819-11	P-840-6		BLUE
P-819-12	P-840-2		BLUE
P-819-13	EMPTY		
P-819-14	EMPTY		
P-819-15	EMPTY		

PLUG -820

FROM	TO	BOARD	COLOR
P-820-1	P-128-3	351	BROWN
P-820-2	P-128-4	351	RED
P-820-3	P-128-5	351	BLUE
P-820-4	P-128-6	351	YELLOW
P-820-5	P-128-7	351	ORANGE
P-820-6	P-128-8	351	BLACK/WHITE
P-820-7	P-128-9	351	PURPLE/WHITE
P-820-8	P-128-10	351	RED/WHITE
P-820-9	P-809-2	361	ORANGE/WHITE
P-820-10			SHIELD
P-820-11	P-809-6	361	CABLE
P-820-12	P-809-5	361	GREEN/WHITE
P-820-13	P-809-7	361	BLUE/WHITE
P-820-14	P-843-3		CABLE
P-820-15	P-843-1		RED/CABLE

PLUG P-820

FROM	TO	BOARD	COLOR
P-820-1	TAB "3" CONTACT #1		BROWN
P-820-2	TABE "2" CONTACT #1		RED
P-820-3	TWIN MALLET XYLO. CONTACT #4		BLUE
P-820-4	TWIN MALLET MARIMBA CONTACT #4		YELLOW
P-820-5	GLOCK TAB CONTACT #4		ORANGE
P-820-6	TWIN MALLET MARIMBA CONTACT #1		WHITE/GRAY
P-820-7	TAB "5" CONTACT #1		WHITE/VIOLET
P-820-8	TWIN MALLET XYLO. CONTACT #1		WHITE/RED
P-820-9	P-836-18	326	WHITE/ORANGE
P-820-10	P-837-6	326	DOUBLE SHIELD
P-820-11	P-837-1	326	COAX #10
P-820-12	P-836-15	326	WHITE/GREEN
P-820-13	P-836-14	326	GRAY
P-820-14	P-837-14	326	RED COAX #11
P-820-15	P-837-15	326	WHITE COAX #11

PLUG P-821

FROM	TO	BOARD	COLOR
P-821-1	PEDAL INPUT TO TONEBARS		CABLE
P-821-2	SHIELD TO L/M AND PEDAL GND.		SHIELD
P-821-3	L/M INPUT TONEBARS		RED CABLE
P-821-4	P-146-2	265	BROWN
P-821-5	P-146-3	265	YELLOW
P-821-6	P-146-4	265	WHITE
P-821-7	P-146-5	265	BLUE
P-821-8	P-7-1 P-129-11	321 351	ORANGE/WHITE ORANGE/WHITE
P-821-9	P-815-6 P-814-6	364 375	BLUE/WHITE BLUE/WHITE
P-821-10	P-815-5 P-814-5	364 375	RED RED
P-821-11	P-815-2 P-814-2	364 375	GREEN/WHITE GREEN/WHITE
P-821-12	P-815-4 P-814-4	364 375	BROWN BROWN
P-821-13	P-815-3 P-814-3	364 374	GRAY GRAY
P-821-14	P-844-1		ORANGE
P-821-15	P-844-3		GREEN/WHITE

PLUG P-821

FROM	TO	BOARD	COLOR
P-821-1	P-837-5	326	WHITE COAX #17
P_821-2	P-837-3	326	SHIELD
P-821-3	P-836-1	326	RED COAX #17
P-821-4	J-126-6	425	BROWN
P-821-5	DELAYED VIBRATO CONTACT #4		YELLOW
P-821-6	VIBRATO "I" TAB CONTACT #4		WHITE
P-821-7	VIBRATO "II" TAB CONTACT #4		BLUE
P-821-8	SUSTAIN UPPER TAB CONTACT #5		WHITE/ORANGE
P-821-9	P-147-15	409	RED
P-821-10	P-147-13	409	RED
P-821-11	P-837-13	326	WHITE/BLUE
P-821-12	PERC. FAST TAB CONTACT #1		WHITE/BROWN
P-821-13	PERC. FAST TAB CONTACT #2		RED
P-821-14	P-147-5	409	ORANGE
P-821-15	J-105-3	208	WHITE/GREEN

PLUG P-822

FROM	TO	BOARD	COLOR
P-822-1	EMPTY		
P-822-2	EMPTY		
P-822-3	PLUG-IN FROM P-827 PIN 12		BROWN
P-822-4	P-828-3	POWER SUPPLY	CABLE
P-822-5	P-828-2	POWER SUPPLY	SHIELD
P-822-6	P-832-10	SWELL PEDAL	BROWN/WHITE
P-822-7	P-832-1	SWELL PEDAL	CABLE
P-822-8	P-832-2	SWELL PEDAL	SHIELD
P-822-9	P-832-3	SWELL PEDAL	CABLE
P-822-10	P-832-4	SWELL PEDAL	CABLE
P-822-11	P-832-5	SWELL PEDAL	SHIELD
P-822-12	EMPTY		
P-822-13	EMPTY		
P-822-14	EMPTY		
P-822-15	EMPTY		

PLUG P-822

FROM	TO	BOARD	COLOR
P-822-1	EMPTY		
P-822-2	EMPTY		
P-822-3	ACOUSTIC TREMOLO CELESTE TAB CONTACT #6		BROWN
P-822-4	J-145-19	377	COAX #7
P-822-5	J-145-20	377	SHIELD
P-822-6	P-823-3		WHITE/BROWN
P-822-7	H0144-7	376	COAX #12
P-822-8	J-143-6 J-144-5	376 376	DOUBLE SHIELD
P-822-9	J-143-8	376	COAX #13
P-822-10	J-145-17	377	COAX #5
P-822-11	J-145-15	377	SHIELD
P-822-12	J-143-5	376	COAX #14
P-822-13	J-145-7	377	COAX #3
P-822-14	NO CONNECTION		SHIELD
P-822-15	J-143-3	376	SHIELD

PLUG P-823 (AUTO VARI RHYTHM ASSEMBLY)

FROM	TO	BOARD	COLOR
P-823-1	SINGLE WIRE		GREEN
P-823-2	SINGLE WIRE		BLACK
P-823-3	P-822-6		WHITE/BROWN
P-823-4	P-836-9	326	WHITE/BLUE
P-823-5	P-836-12	326	ORANGE
P-823-6	P-427-9	409	WHITE/GRAY
P-823-7	P-836-16	326	WHITE/ORANGE
P-823-8	P-836-4	326	WHITE/RED
P-823-9	P-836-10	326	WHITE/VIOLET
P-823-10	P-836-7	326	BROWN
P-823-11	NO CONNECTION		SHIELD
P-823-12	J-144-9	376	COAX #15
P-823-13	EMPTY		
P-823-14	NO CONNECTION		SHIELD
P-823-15	J-145-18	377	COAX #6

PLUG P-824

FROM	TO	BOARD	COLOR
P-824-1	P-827-7	POWER SUPPLY	HEAVY YELLOW
P-824-2	EMPTY		
P-824-3	PIN 5 OF TRANSFORMER PLUG-IN		ORANGE
P-824-4	P-827-8	POWER SUPPLY	HEAVY BROWN
P-824-5	EMPTY		
P-824-6	PIN 2 OF TRANSFORMER PLUG-IN		BLUE

PLUG P-825 (POWER AMP)

FROM	TO	BOARD	COLOR
P-825-1	P-826-1 P-828-5	POWER SUPPLY POWER SUPPLY	RED RED
P-825-2	P-826-2 P-828-4	POWER SUPPLY POWER SUPPLY	ORANGE ORANGE
P-825-3	CASSETTE TERM. STRIP		BROWN
P-825-4	EMPTY		
P-825-5	GROUND STRAP		HEAVY BLACK
P-825-6	EMPTY		
P-825-7	EMPTY		
P-825-8	P-839-9		SHIELD
P-825-9	P-839-12		CABLE

PLUG P-826 (POWER AMP)

FROM	TO	BOARD	COLOR
P-826-1	P-825-1 P-828-5	POWER SUPPLY POWER SUPPLY	RED RED
P-826-2	P-825-2 P-828-4	POWER SUPPLY POWER SUPPLY	ORANGE ORANGE
P-826-3	CASSETTE TERM. STRIP		WHITE
P-826-4	EMPTY		
P-826-5	GROUND STRAP		HEAVY BLACK
P-826-6	EMPTY		
P-826-7	EMPTY		
P-826-8	P-839-7		SHIELD
P-826-9	P-839-10		CABLE

PLUG P-827 (POWER SUPPLY)

FROM	TO	BOARD	COLOR
P-827-1	P-838-1	LESLIE	HEAVY BLUE
P-827-2	ON/OFF SWITCH PIN 2		HEAVY BLUE
P-827-3	ON/OFF SWITCH PIN 3		HEAVY YELLOW
P-827-4	ON/OFF SWITCH PIN 1		HEAVY GRAY
-827-5	P-838-5	LESLIE	HEAVY BROWN
P-827-6	P-838-4	LESLIE	HEAVY GRAY
P-827-7	P-824-1		HEAVY YELLOW
P-827-8	P-824-4		HEAVY BROWN
P-827-9	P-838-3 CASSETTE TERM. STRIP	LESLIE	RED RED
P-827-10	SPEAKER CASSETTE TERM. STRIP		LIGHT GREEN DARK GREEN
P-827-11	P-838-2		HEAVY YELLOW
P-827-12	PLUGS IN P-822-3		BROWN

PLUG P-828 (POWER AMP)

FROM	TO	BOARD	COLOR
P-828-1	SPEAKER		BLACK
P-828-2	P-822-5		SHIELD
P-828-3	P-822-4		CABLE
P-828-4	P-825-2 P-826-2	POWER SUPPLY POWER AMP.	ORANGE ORANGE
P-828-5	P-825-1 P-826-1	POWER SUPPLY POWER AMP.	RED RED
P-828-6	EMPTY		
P-828-7	P-834-3 +25 TERM. STRIP	166	GREEN GREEN
P-828-8	EMPTY		
P-828-9	GRD.STRAP BELOW TWEETED		HEAVY BLACK
P-828-10	-28 TERM. STRIP		PURPLE
P-828-11	EMPTY		
P-828-12	EMPTY		
P-828-13	CASSETTE TERM. STRIP		YELLOW
P-828-14	P-832-14	SWELL PEDAL	WHITE
P-828-15	-24V TERM. STRIP		YELLOW/WHITE

FIGURE 3-42
PLUG & PIN NUMBER WIRING CHART
(PLUG #819 THRU P-828)

PLUG & PIN NOS.) SEE PHYSICAL LAYOUT

(PAGE 3-38)

TO	BOARD	COLOR
J-145-4	377	COAX #2
NO CONNECTION		SHIELD
NO CONNECTION		SHIELD
J-143-13	376	COAX #18
NO CONNECTION		SHIELD
J-145-9	377	COAX #14
NO CONNECTION		SHIELD
EMPTY		
NO CONNECTION		SHIELD
J-145-21	377	COAX #8
EMPTY		
J-145-1	377	COAX #1

TO	BOARD	COLOR
P-834-7	166	CABLE
P-834-5	166	SHIELD
		SHIELD
P-834-6	166	CABLE
P-834-5	166	SHIELD
P-834-1	166	CABLE
P-826-8	POWER SUPPLY AMP	SHIELD
EMPTY		
P-825-8	POWER SUPPLY AMP	SHIELD
P-826-9	POWER SUPPLY AMP	CABLE
EMPTY		
P-825-9	POWER SUPPLY AMP	CALBE

124-000415 (ARPEGGIAMATIC BOARD)

TO	BOARD	COLOR
P-819-4	ARP	WHITE
P-819-12	ARP	BLUE
P-819-2	ARP	WHITE
P-819-1	ARP	BLUE
P-819-3	ARP	WHITE
P-819-11	ARP	BLUE
P-819-10	ARP	WHITE
P-819-6	ARP	BLUE
P-819-8	ARP	WHITE
P-819-7	ARP	BLUE
P-819-9	ARP	WHITE
P-819-5	ARP	BLUE
-28 TERM. STRIP		PURPLE
ARP SWITCH		WHITE
ARP SWITCH		BLUE

(12) PLUG P-841 (ARPEGGIAMATIC)

FROM	TO	BOARD	COLOR
P-841-1	GROUND BUS		BLACK
P-841-2	P-804-10 P-907-10	323	WHITE WHITE
P-841-3	P-804-5 P-907-5	323	RED RED
P-841-4	P-804-7 P-907-7	323	RED RED
P-841-5	P-804-6 P-907-6	323	WHITE WHITE
P-841-6	P-803-20 P-905-20	323	WHITE WHITE
P-841-7	P-804-4 P-907-4	323	WHITE WHITE
P-841-8	P-804-9 P-907-9	323	RED RED
P-841-9	-28 TERM. STRIP		PURPLE
P-841-10	P-803-21 P-905-21	323	RED RED
P-841-11	P-804-3 P-907-3	323	RED RED
P-841-12	P-803-23 P-905-23	323	RED RED
P-841-13	P-804-1 P-907-1	323	RED RED
P-841-14	P-803-24 P-905-24	323	WHITE WHITE
P-841-15	P-804-2 P-907-2	323	WHITE WHITE
P-841-16	P-803-22 P-905-22	323	WHITE WHITE
P-841-17	P-804-14 P-907-14	323	WHITE WHITE
P-841-18	P-804-12 P-907-12	323	WHITE WHITE
P-841-19	P-804-16 P-907-16	323	WHITE WHITE
P-841-20	P-804-13 P-907-13	323	RED RED
P-841-21	P-804-15 P-907-15	323	RED RED
P-841-22	P-804-11 P-907-11	323	RED RED
P-841-23	EMPTY		
P-841-24	EMPTY		

PLUG P-842

FROM	TO	BOARD	COLOR
P-842-1	P-836-6	326	BROWN
P-842-2	P-836-14	326	GRAY
P-842-3	J-126-10	425	WHITE/ORANGE

PLUG P-842

FROM	TO	BOARD	COLOR
P-842-1	P-805-1	362	BROWN
P-842-2	P-805-4	362	GRAY
P-842-3	P-805-2	362	ORANGE/WHITE

23 (KEYER DIVIDER BOARD)

TO	BOARD	COLOR
P-804-1		RED
P-841-13		RED
P-804-2		WHITE
P-841-15		WHITE
P-804-3		RED
P-841-11		RED
P-804-4		WHITE
P-841-7		WHITE
P-804-5		RED
P-841-3		RED
P-804-6		WHITE
P-841-5		WHITE
P-804-7		RED
P-841-4		RED
P-804-8		WHITE
P-804-9		RED
P-841-8		RED
P-804-10		WHITE
P-841-2		WHITE
P-804-11		RED
P-841-22		RED
P-804-12		WHITE
P-841-18		WHITE
P-804-13		RED
P-841-20		RED
P-804-14		WHITE
P-841-17		WHITE
P-804-15		RED
P-841-21		RED
P-804-16		WHITE
P-841-19		WHITE
OPEN		
P-804-18		WHITE
P-804-19		RED
P-804-20		WHITE
P-804-21		RED
P-804-22		WHITE
P-804-23		RED
P-804-24		WHITE

FIGURE 3-44
PLUG & PIN NUMBER WIRING CHART
(PLUG #843 THRU P-907)

PLUG P-832 (SWELL PEDAL)

FROM	TO	BOARD	COLOR
P-832-1	P-822-7		CABLE
P-832-2	P-822-8		SHIELD
P-832-3	P-822-9		CABLE
P-832-4	P-822-10		CABLE
P-832-5	P-822-11		SHIELD
P-832-6	EMPTY		
P-832-7	EMPTY		
P-832-8	EMPTY		
P-832-9	EMPTY		
P-832-10	P-822-6		WHITE
P-832-11	P-832-15 GROUND STRAP		BLACK BLACK
P-832-12	EMPTY		
P-832-13	EMPTY		
P-832-14	P-828-14	POWER SUPPLY	WHITE
P-832-15	P-832-11		BLACK

PLUG P-833 - 116-000029 (PEDAL ASSEMBLY)

FROM	TO	BOARD	COLOR
P-833-1	P-808-2	361	BROWN
P-833-2	P-808-3	361	RED
P-833-3	P-808-4	361	ORANGE
P-833-4	P-808-5	361	YELLOW
P-833-5	P-808-6	361	GREEN
P-833-6	P-808-7	361	BLUE
P-833-7	P-808-8	361	PURPLE
P-833-8	P-808-9	361	GRAY
P-833-9	P-808-10	361	WHITE
P-833-10	P-808-11	361	BLACK/WHITE
P-833-11	P-808-12	361	BROWN/WHITE
P-833-12	P-808-13	361	RED/WHITE
P-833-13	P-808-14	361	ORANGE/WHITE
P-833-14	P_808-1	361	BLACK
P-833-15	P-808-15	361	YELLOW/WHITE

PLUG P-834 -124-000160 (REVERB BOARD)

FROM	TO	BOARD	COLOR
P-834-1	P-839-6		CABLE
P-834-2	EMPTY		
P-834-3	P-828-7 +25 TERM. STRIP	POWER SUPPLY	GREEN GREEN
P-834-4	GROUND STRAP		BLACK
P-834-5	P-839-2		SHIELD
P-834-6	P-839-4		CABLE
P-834-7	P-839-7		CABLE
P-834-8	EMPTY		
P-834-9	EMPTY		

PLUG P-835 (POWER AMP. ASSEMBLY)

FROM	TO	BOARD	COLOR
P-835-1	MUSIC LITE TRANSFORMER SECONDARY		BROWN
P-835-2	MUSIC LIGHT		RED
P-835-3	PRIMARY		GRAY
P-835-4	SECONDARY		RED
P-835-5	MUSIC LIGHT		GREEN
P-835-6	PRIMARY		YELLOW

(16) PLUG P-836 - 124-000326 (PEDAL BOARD)

FROM	TO	BOARD	COLOR
P-836-1	P-821-3		RED COAX #7
P-836-2	EMTPY		
P-836-3	P-837-9	326	RED
P-836-4	P-823-8		WHITE/RED
P-836-5	P-147-12	409	YELLOW
P-836-6	P-842-1		BROWN
P-836-7	P-823-10		BROWN
P-836-8	PERC. FAST TAB CONTACT #4 SECOND VOICE TAB CONTACT #2		DOUBLE BLACK
P-836-9	P-823-4		WHITE/BLUE
P-836-10	P-823-9		WHITE/VIOLET
P-836-11	P-147-14 J-126-5	409 425	DOUBLE VIOLET
P-836-12	P-823-5		ORANGE
P-836-13	PEDAL SUSTAIN TAB CONTACT #6		BLUE
P-836-14	P-820-13 P-842-2		DOUBLE GRAY
P-836-15	P-820-12 PEDAL SUSTAIN TAB CONTACT #3		DOUBLE WHITE/ GREEN
P-836-16	P-823-7		ORANGE/WHITE
P-836-17	P-147-7 J-126-7	409 425	DOUBLE WHITE/ YELLOW
P-836-18	P-820-9		WHITE/ORANGE

(16) PLUG P-837 - 124-000326 (PEDAL BOARD)

FROM	TO	BOARD	COLOR
P-837-1	P-820-11		COAX #10
P-837-2	J-126-8	425	WHITE/BLUE
P-837-3	P-821-2 PEDAL MUTE CONTACT #5		DOUBLE SHIELD
P-837-4	PEDAL MUTE CONTACT #4		WHITE COAX #16
P-837-5	P-821-1		CLEAR COAX #17
P-837-6	P-820-10		SHIELD
P-837-7	SINGLE WIRE		BLACK
P-837-8	PEDAL MUTE CONTACT #6		RED COAX #16
P-837-9	P-836-3	326	RED
P-837-10	ACOUSTIC TREMOLO ON LOWER TAB CONTACT #5		WHITE/BROWN
P-837-11	PIANO SOLO TAB CONTACT #5		WHITE/BROWN
P-837-12	BRILLIANCE TAB CONTACT #6		WHITE/BROWN
P-837-13	P-821-10 PIANO SOLO CONTACT #2		DOUBLE WHITE/ BLUE
P-837-14	P-820-14		RED COAX #11
P-837-15	P-820-15		WHITE COAX #11

PLUG P-838 (LESLIE)

FROM	TO	BOARD	COLOR
P-838-1	P-827-1	POWER SUPPLY	HEAVY BLUE
P-838-2	P-827-11		HEAVY YELLOW
P-838-3	P-827-9 CASSETTE TERM. STRIP	POWER SUPPLY	RED RED
P-838-4	P-827-6		HEAVY GRAY
P-838-5	P-827-5	POWER SUPPLY	HEAVY BROWN
P-838-6	GROUND STRAP		BLACK

PLUG P-839

FROM	TO	BOARD	COLOR
P-839-1	J-145-4	377	COAX #2
P-839-2	NO CONNECTION		SHIELD
P-839-3	NO CONNECTION		SHIELD
P-839-4	J-143-13	376	COAX #18
P-839-5	NO CONNECTION		SHIELD
P-839-6	J-145-9	377	COAX #14
P-839-7	NO CONNECTION		SHIELD
P-839-8	EMPTY		
P-839-9	NO CONNECTION		SHIELD
P-839-10	J-145-21	377	COAX #8
P-839-11	EMPTY		
P-839-12	J-145-1	377	COAX #1

PLUG P-839

FROM	TO	BOARD	COLOR
P-839-1	P-834-7	166	CABLE
P-839-2	P-834-5	166	SHIELD
P-839-3			SHIELD
P-839-4	P-834-6	166	CABLE
P-839-5	P-834-5	166	SHIELD
P-839-6	P-834-1	166	CABLE
P-839-7	P-826-8	POWER SUPPLY AMP	SHIELD
P-839-8	EMPTY		
P-839-9	P-825-8	POWER SUPPLY AMP	SHIELD
P0839-10	P-826-9	POWER SUPPLY AMP	CABLE
P-839-11	EMPTY		
P-839-12	P-825-9	POWER SUPPLY AMP	CALBE

(12) PLUG P-840 - 124-000415 (ARPEGGIAMATIC BOARD)

FROM	TO	BOARD	COLOR
P-840-1	P-819-4	ARP	WHITE
P-840-2	P-819-12	ARP	BLUE
P-840-3	P-819-2	ARP	WHITE
P-840-4	P-819-1	ARP	BLUE
P-840-5	P-819-3	ARP	WHITE
P-840-6	P-819-11	ARP	BLUE
P-840-7	P-819-10	ARP	WHITE
P-840-8	P-819-6	ARP	BLUE
P-840-9	P-819-8	ARP	WHITE
P-840-10	P-819-7	ARP	BLUE
P-840-11	P-819-9	ARP	WHITE
P-840-12	P-819-5	ARP	BLUE
P-840-13	-28 TERM. STRIP		PURPLE
P-840-14	ARP SWITCH		WHITE
P-840-15	ARP SWITCH		BLUE

(12) PLUG P-841 (ARPEGGIAMATIC)

FROM	TO	BOARD	COLOR
P-841-1	GROUND BUS		BLACK
P-841-2	P-804-10 P-907-10	323	WHITE WHITE
P-841-3	P-804-5 P-907-5	323	RED RED
P-841-4	P-804-7 P-907-7	323	RED RED
P-841-5	P-804-6 P-907-6	323	WHITE WHITE
P-841-6	P-803-20 P-905-20	323	WHITE WHITE
P-841-7	P-804-4 P-907-4	323	WHITE WHITE
P-841-8	P-804-9 P-907-9	323	RED RED
P-841-9	-28 TERM. STRIP		PURPLE
P-841-10	P-803-21 P-905-21	323	RED RED
P-841-11	P-804-3 P-907-3	323	RED RED
P-841-12	P-803-23 P-905-23	323	RED RED
P-841-13	P-804-1 P-907-1	323	RED RED
P-841-14	P-803-24 P-905-24	323	WHITE WHITE
P-841-15	P-804-2 P-907-2	323	WHITE WHITE
P-841-16	P-803-22 P-905-22	323	WHITE WHITE
P-841-17	P-804-14 P-907-14	323	WHITE WHITE
P-841-18	P-804-12 P-907-12	323	WHITE WHITE
P-841-19	P-804-16 P-907-16	323	WHITE WHITE
P-841-20	P-804-13 P-907-13	323	RED RED
P-841-21	P-804-15 P-907-15	323	RED RED
P-841-22	P-804-11 P-907-11	323	RED RED
P-841-23	EMPTY		
P-841-24	EMPTY		

PLUG P-842

FROM	TO	BOARD	COLOR
P-842-1	P-836-6	326	BROWN
P-842-2	P-836-14	326	GRAY
P-842-3	J-126-10	425	WHITE/ORANGE

PLUG P-842

FROM	TO	BOARD	COLOR
P-842-1	P-805-1	362	BROWN
P-842-2	P-805-4	362	GRAY
P-842-3	P-805-2	362	ORANGE/WHITE

FIGURE 3-43
PLUG & PIN NUMBER WIRING CHART
(PLUG #832 THRU P-842)

POINT TO POINT WIRING CHART OF 8200 SERIES ORGAN (PLUG & PIN NOS.)

PLUG P-843

FROM	TO	BOARD	COLOR
P-843-1	16' PEDAL TONEBAR		BROWN
P-843-2	EMPTY		
P-843-3	8' PEDAL TONEBAR		RED

PLUG P-843

FROM	TO	BOARD	COLOR
P-843-1	P-820-15		RED CABLE
P-843-2	EMPTY		
P-843-3	P-820-14		CABLE

PLUG P-844

FROM	TO	BOARD	COLOR
P-844-1	P-821-14		ORANGE
P-844-2	EMPTY		
P-844-3	P-821-15		GREEN/WHITE

PLUG P-844

FROM	TO	BOARD	COLOR
P-844-1	P-127-3		ORANGE
P-844-2	EMPTY		
P-844-3	P-246-6	PISTONS	GREEN/WHITE

PLUG P-845

FROM	TO	BOARD	COLOR
P-845-1	LED		RED
P-845-2	EMPTY		
P-845-3	LED		BLUE

PLUG P-845

FROM	TO	BOARD	COLOR
P-845-1	P-127-1	351	RED
P-845-2	EMPTY		
P-845-3	P-127-2	351	BLUE

(3) PLUG P-903 - 124-000323 (KEYER DIVIDER)

FROM	TO	BOARD	COLOR
P-903-1	P-146-22	365	BROWN
	P-7-12	321	BROWN
P-903-2	P-146-21	265	RED
	P-7-13	321	RED
P-903-3	P-146-20	265	ORANGE
	P-7-14	321	ORANGE
P-903-4	P-146-19	265	YELLOW
	P-7-15	321	YELLOW
P-903-5	P-146-18	265	BLUE
	P-7-8	321	BLUE
P-903-6	P-146-17	265	PURPLE
	P-7-9	321	PURPLE
P-903-7	P-146-16	265	GRAY
	P-7-10	321	GRAY
P-903-8	P-146-15	265	WHITE
	P-7-11	321	WHITE
P-903-9	P-146-14	265	YELLOW
	P-7-4	321	YELLOW
P-903-10	P-146-13	265	BROWN
	P-7-7	321	BROWN
P-903-11	P-146-12	265	RED
	P-7-6	321	RED
P-903-12	P-146-11	265	ORANGE
	P-7-5	321	ORANGE

(3) PLUG 905 - 124-000323 (KEY DIVIDER BOARD)

FROM	TO	BOARD	COLOR
P-905-1	P-803-1		RED
P-905-2	P-803-2		WHITE
P-905-3	P-803-3		RED
P-905-4	P-803-4		WHITE
P-905-5	P-803-5		RED
P-905-6	P-803-6		WHITE
P-905-7	P-803-7		RED
P-905-8	P-803-8		WHITE
P-905-9	P-803-9		RED
P-905-10	P-803-10		WHITE
P-905-11	P-803-11		RED
P-905-12	P-803-12		WHITE
P-905-13	P-803-13		RED
P-905-14	P-803-14		WHITE
P-905-15	P-803-15		RED
P-905-16	P-803-16		WHITE
P-905-17	P-803-17 (OPEN)		
P-905-18	P-803-18		WHITE
P-905-19	P-803-19		RED
P-905-20	P-803-20		WHITE
	P-841-6		WHITE
P-905-21	P-803-21		RED
	P-841-10		RED
P-905-22	P-803-22		WHITE
	P-841-16		WHITE
P-905-23	P-803-23		RED
	P-841-12		RED
P-905-24	P-803-24		WHITE
	P-841-14		WHITE

(3) PLUG P-906 - 124-000323 (KEYER DIVIDER BOARD)

FROM	TO	BOARD	COLOR
P-906-1	P-807-1	361	BLACK
P-906-2	P-806-13	361	WHITE
P-906-3	P-807-3	361	WHITE
P-906-4	P-806-5	361	BLACK
P-906-5	P-807-5	361	BLACK
P-906-6	P-807-7	361	WHITE
P-906-7	P-806-7	361	WHITE
P-906-8	P-807-9	361	BLACK
P-906-9	P-807-11	361	WHITE
P-906-10	P-806-9	361	BLACK
P-906-11	P-806-1	361	BLACK
P-906-12	P-806-3	361	WHITE
P-906-13	P-806-11	361	WHITE
P-906-14	EMPTY		
P-906-15	EMPTY		

(3) P-907 - 124-000323 (KEYER DIVIDER BOARD)

FROM	TO	BOARD	COLOR
P-907-1	P-804-1		RED
	P-841-13		RED
P-907-2	P-804-2		WHITE
	P-841-15		WHITE
P-907-3	P-804-3		RED
	P-841-11		RED
P-907-4	P-804-4		WHITE
	P-841-7		WHITE
P-907-5	P-804-5		RED
	P-841-3		RED
P-907-6	P-804-6		WHITE
	P-841-5		WHITE
P-907-7	P-804-7		RED
	P-841-4		RED
P-907-8	P-804-8		WHITE
P-907-9	P-804-9		RED
	P-841-8		RED
P-907-10	P-804-10		WHITE
	P-841-2		WHITE
P-907-11	P-804-11		RED
	P-841-22		RED
P-907-12	P-804-12		WHITE
	P-841-18		WHITE
P-907-13	P-804-13		RED
	P-841-20		RED
P-907-14	P-804-14		WHITE
	P-841-17		WHITE
P-907-15	P-804-15		RED
	P-841-21		RED
P-907-16	P-804-16		WHITE
	P-841-19		WHITE
P-907-17	OPEN		
P-907-18	P-804-18		WHITE
P-907-19	P-804-19		RED
P-907-20	P-804-20		WHITE
P-907-21	P-804-21		RED
P-907-22	P-804-22		WHITE
P-907-23	P-804-23		RED
P-907-24	P-804-24		WHITE

FIGURE 3-44
PLUG & PIN NUMBER WIRING CHART
(PLUG #843 THRU P-907)

CONTROL PANEL TAB SWITCH ASSEMBLY WIRING CHART

SWITCH / TERM	REPEAT	PERCUSSION FAST	2	3	5	GLOCK	TWIN MALLET XYLOPHONE	TWIN MALLET MARIMBA	SECOND VOICE	PIZZICATO 1 (OBOE)	PIZZICATO 2 (SAX)
	(S29)	(S28)	(S27)	(S26)	(S25)	(S24)	(S23)	(S22)	(S21)	(S20)	(S19)
1	J125-13	P821-12 S18-6	P820-2	P820-1	P820-7	NC	P820-8	P820-6	P147-11	NC	NC
2	P147-16 S28-4	P821-13 S18-5	S26-2	S27-2 S25-2	S26-2 S24-5	NC	S22-2 S24-5	J125-12 S23-2	P836-8 J125-1	NC	NC
3	J125-14	NC	NC	NC	NC	NC	NC	NC	J125-9	NC	NC
4	P147-3 J126-1	P836-8 S29-2	NC	NC	NC	P820-5	P820-3	P820-4	S29-6	J106-14	J106-13
5	S21-6	J125-5	S26-6	S25-6	J125-3	S23-2 S25-2	S22-5	J125-11 S23-5	J125-8	J126-12 S19-5	S20-5 S18-2
6	P147-8 S21-4	NC	J125-4	S27-5	S26-5	NC	NC	NC	S29-5	NC	NC

SWITCH / TERM	BANJO (POST HORN)	HARPSICHORD (VIOLIN)	PIANO (DIAPASON)	PIANO SOLO	SUSTAIN UPPER SHORT	SUSTAIN UPPER	SUSTAIN TO FOOT SWITCH	PEDAL SUSTAIN	PEDAL MUTE	LOWER TO PEDAL	ACCOUSTIC TREMOLO ON UPPER
	(S18)	(S17)	(S16)	(S15)		(S14)		(S13)	(S12)		(S11)
1	J106-12	J106-8	J106-7	NC		P147-21		NC	NC		NC
2	S19-5 S17-2	S18-2	J126-14	P837-13		J126-7		S13-5 S14-6	NC		NC
3	NC	NC	NC	S16-5		NC		P836-15	NC		NC
4	NC	NC	NC	J125-15		NC		NC	P837-4		J143-12
5	S17-6 S28-2	S16-6	S15-3	P837-10		P821-8		S13-2 S9-5	P837-3		J143-1
6	J126-2 S28-6	S18-5	S17-5	J106-3		J125-1 S13-2		P836-13	P837-8		J143-9

SWITCH / TERM	ACCOUSTIC TREMOLO ON LOWER	ACCOUSTIC TREMOLO CELESTE	ACCOUSTIC TREMOLO CHORUS	VIBRATO 1	VIBRATO 2	DELAY VIBRATO	REVERB 1	REVERB 2	ACCOUSTIC TREMOLO ON REVERB	BRILLANCE	VOLUME SOFT
	(S10)	(S9)	(S8)	(S7)	(S6)	(S5)	(S4)	(S3)		(S2)	(S1)
1	NC	NC	NC	NC	NC	NC	J145-9	NC		NC	J144-2
2	NC	NC	NC	NC	NC	NC	S3-4	NC		S2-5 S1-2	S1-5 S2-2
3	NC	NC	NC	NC	NC	NC	NC	NC		J143-4	NC
4	J143-11	NC	J145-8	P821-6	P821-7	P821-5	NC	J145-10 S4-2		NC	J144-1
5	J837-10	S13-5	J145-2	S6-6	J126-5	P147-19	J144-12 S2-5	J145-11		S2-2 S4-5	S1-2
6	J143-10	P822-3	NC	J126-6	S7-5	NC	S3-6	S4-6		P837-12	NC

SECTION IV
PARTS LIST

AURORA - 8200 SERIES

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(3) Case Assembly

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OPTIONAL EQUIPMENT
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Head Phone Set
Tone Cabinet
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Owner Playing Guide

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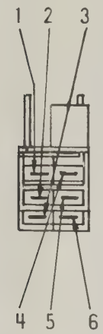
CONTROL PANEL TAB SWITCH ASSEMBLY WIRING CHART

SWITCH TERM	REPEAT	PERCUSSION FAST	2	3	5	GLOCK	TWIN MALLET XYLOPHONE	TWIN MALLET MARIMBA	SECOND VOICE	PIZZICATO 1 (OBOE)	PIZZICATO 2 (SAX)
	(S29)	(S28)	(S27)	(S26)	(S25)	(S24)	(S23)	(S22)	(S21)	(S20)	(S19)
1	WHT	WHT/RED(2)	RED	BRN	WHT/VIO	NC	WHT/RED	WHT/BLK	YEL	NC	NC
2	BLK(2)	RED(2)	WHT	WHT(2)	WHT(2)	NC	WHT(2)	WHT(2)	BLK(2)	NC	NC
3	BLU	NC	NC	NC	NC	NC	NC	NC	ORN	NC	NC
4	RED(2)	BLK(2)	NC	NC	NC	ORN	BLU	YEL	WHT/BLK	WHT/VIO	WHT/VIO
5	BRN	BRN	WHT/RED	RED	BLU	WHT(2)	RED	RED(2)	WHT/RED	WHT/ORN(2)	WHT/ORN(2)
6	WHT/BLK(2)	NC	BRN	WHT/RED	RED	NC	NC	NC	BRN	NC	NC

SWITCH TERM	BANJO (POST HORN)	HARPSICHORD (VIOLIN)	PIANO (DIAPASON)	PIANO SOLO	SUSTAIN UPPER SHORT	SUSTAIN UPPER	SUSTAIN TO FOOT SWITCH	PEDAL SUSTAIN	PEDAL MUTE	LOWER TO PEDAL	ACCOUSTIC TREMOLO ON UPPER
	(S18)	(S17)	(S16)	(S15)		(S14)		(S13)	(S12)		(S11)
1	WHT/VIO	WHT/VIO	WHT/VIO	NC		BLU		NC	NC		NC
2	WHT/ORN(2)	WHT/ORN	RED	WHT/BLU		WHT/YEL(2)		BLK(2)	NC		NC
3	NC	NC	NC	WHT/ORN		NC		WHT/GRN	NC		NC
4	NC	NC	NC	BLU		NC		NC	CLEAR		WHT/BRN
5	RED(2)	WHT/BRN	WHT/ORN	WHT/BRN		WHT/ORN		BLK(2)	SHIELD		WHT/BLU
6	WHT/BRN(2)	RED	WHT/BRN	WHT/GRN		BLK(2)		BLU	RED		BLU

SWITCH TERM	ACCOUSTIC TREMOLO ON LOWER	ACCOUSTIC TREMOLO CELESTE	ACCOUSTIC TREMOLO CHORUS	VIBRATO 1	VIBRATO 2	DELAY VIBRATO	REVERB 1	REVERB 2	ACCOUSTIC TREMOLO ON REVERB	BRILLANCE	VOLUME SOFT
	(S10)	(S9)	(S8)	(S7)	(S6)	(S5)	(S4)	(S3)		(S2)	(S1)
1	NC	NC	NC	NC	NC	NC	RED	NC		NC	WHT/BRN
2	NC	NC	NC	NC	NC	NC	WHT	NC		BLK(2)	BLK(2)
3	NC	NC	NC	NC	NC	NC	NC	NC		BLU	NC
4	WHT/BLU	NC	WHT	WHT	BLU	YEL	NC	WHT(2)		NC	WHT
5	WHT/BRN	BLK(2)	BLU	YEL	VIO(2)	CLEAR	(2)BLK	RED		BLK(2)	BLK
6	BLU	BRN	NC	BRN	YEL	NC	BLU	BLU		WHT/BRN	NC

SWITCH VIEWED FROM FRONT OF ORGAN WITH CONTROL PANEL IN THE SWING UP POSITION



WITH TAB SWITCH IN THE UP(OFF) POSITION:
IF SWITCH TERMINAL 5 & 6 OR 2 & 3 ARE USED, THE RESULT WILL BE A NORMALLY OPEN SWITCH.

IF SWITCH TERMINAL 5 & 4 OR 2 & 1 ARE USED, THE RESULT WILL BE A NORMALLY CLOSED SWITCH.

CONTROL PANEL TAB SWITCH ASSEMBLY WIRING CHART

SWITCH TERM	REPEAT	PERCUSSION FAST	2	3	5	GLOCK	TWIN MALLET XYLOPHONE	TWIN MALLET MARIMBA	SECOND VOICE	PIZZICATO 1 (OBOE)	PIZZICATO 2 (SAX)
	(S29)	(S28)	(S27)	(S26)	(S25)	(S24)	(S23)	(S22)	(S21)	(S20)	(S19)
1	J125-13	P821-12 S18-6	P820-2	P820-1	P820-7	NC	P820-8	P820-6	P147-11	NC	NC
2	P147-16 S28-4	P821-13 S18-5	S26-2	S27-2 S25-2	S26-2 S24-5	NC	S22-2 S24-5	J125-12 S23-2	P836-8 J126-1	NC	NC
3	J125-14	NC	NC	NC	NC	NC	NC	NC	J125-9	NC	NC
4	P147-3 J126-1	P836-8 S29-2	NC	NC	NC	P820-5	P820-3	P820-4	S29-6	J106-14	J106-13
5	S21-6	J125-5	S26-6	S25-6	J125-3	S23-2 S25-2	S22-5	J125-11 S23-5	J125-8	J126-12 S19-5	S20-5 S18-2
6	P147-8 S21-4	NC	J125-4	S27-5	S26-5	NC	NC	NC	S29-5	NC	NC

SWITCH TERM	BANJO (POST HORN)	HARPSICHORD (VIOLIN)	PIANO (DIAPASON)	PIANO SOLO	SUSTAIN UPPER SHORT	SUSTAIN UPPER	SUSTAIN TO FOOT SWITCH	PEDAL SUSTAIN	PEDAL MUTE	LOWER TO PEDAL	ACCOUSTIC TREMOLO ON UPPER
	(S18)	(S17)	(S16)	(S15)		(S14)		(S13)	(S12)		(S11)
1	J106-12	J106-8	J106-7	NC		P147-21		NC	NC		NC
2	S19-5 S17-2	S18-2	J126-14	P837-13		J126-7		S13-5 S14-6	NC		NC
3	NC	NC	NC	S16-5		NC		P836-15	NC		NC
4	NC	NC	NC	J125-15		NC		NC	P837-4		J143-12
5	S17-6 S28-2	S16-6	S15-3	P837-10		P821-8		S13-2 S9-5	P837-3		J143-1
6	J126-2 S28-6	S18-5	S17-5	J106-3		J125-1 S13-2		P836-13	P837-8		J143-9

SWITCH TERM	ACCOUSTIC TREMOLO ON LOWER	ACCOUSTIC TREMOLO CELESTE	ACCOUSTIC TREMOLO CHORUS	VIBRATO 1	VIBRATO 2	DELAY VIBRATO	REVERB 1	REVERB 2	ACCOUSTIC TREMOLO ON REVERB	BRILLANCE	VOLUME SOFT
	(S10)	(S9)	(S8)	(S7)	(S6)	(S5)	(S4)	(S3)		(S2)	(S1)
1	NC	NC	NC	NC	NC	NC	J145-9	NC		NC	J144-2
2	NC	NC	NC	NC	NC	NC	S3-4	NC		S2-5 S1-2	S1-5 S2-2
3	NC	NC	NC	NC	NC	NC	NC	NC		J143-4	NC
4	J143-11	NC	J145-8	P821-6	P821-7	P821-5	NC	J145-10 S4-2		NC	J144-1
5	J837-10	S13-5	J145-2	S6-6	J126-5	P147-19	J144-12 S2-5	J145-11		S2-2 S4-5	S1-2
6	J143-10	P822-3	NC	J126-6	S7-5	NC	S3-6	S4-6		P837-12	NC

FIGURE 3-45
CONTROL PANEL TAB SWITCH
WIRING CHART

SECTION IV
PARTS LIST

AURORA - 8200 SERIES

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(2) Music Panel

(3) Case Assembly

(4) Auto Vari 64 & Top Panel
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(5) Control Panel & Under Top Assembly

(6) Upper Manual & Tone Bar Assembly

(7) Front Strip Assembly

(8) Lower Manual & End Block Assembly

(9) Panel & Grille Cloth Assembly

(10) Expression Pedal Assembly
See Exposed View (4-8)

(11) Pedal Keyboard Assembly
See Exposed View (4-6)

CONSOLE (FULL REAR VIEW) 4-4

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(13) Percussion Keyer #2(124-000375)
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(14) Rear Cover (Back)

(15) Cassette & Phone Jack Term. Assy.

(16) Upper Manual Shelf Assy.
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(18) Tremolo Assembly
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(19) Speakers

(20) Power Supply & Amp. Assembly
See Exposed View (Page 4-7)

(21) Reverberation Assembly

OPTIONAL EQUIPMENT
Cassette Kit
Head Phone Set
Tone Cabinet
Synthesizer
Technical Service Manual
Owner Playing Guide

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KEY & SPRING MODULE ASSY.
(EXPOSED VIEW) 4-8

ROTARY TREMOLO ASSY.(EXPOSED VIEW) 4-9
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AUTO VARI 64 RHYTHM ASSEMBLY
(EXPOSED VIEW) 4-10
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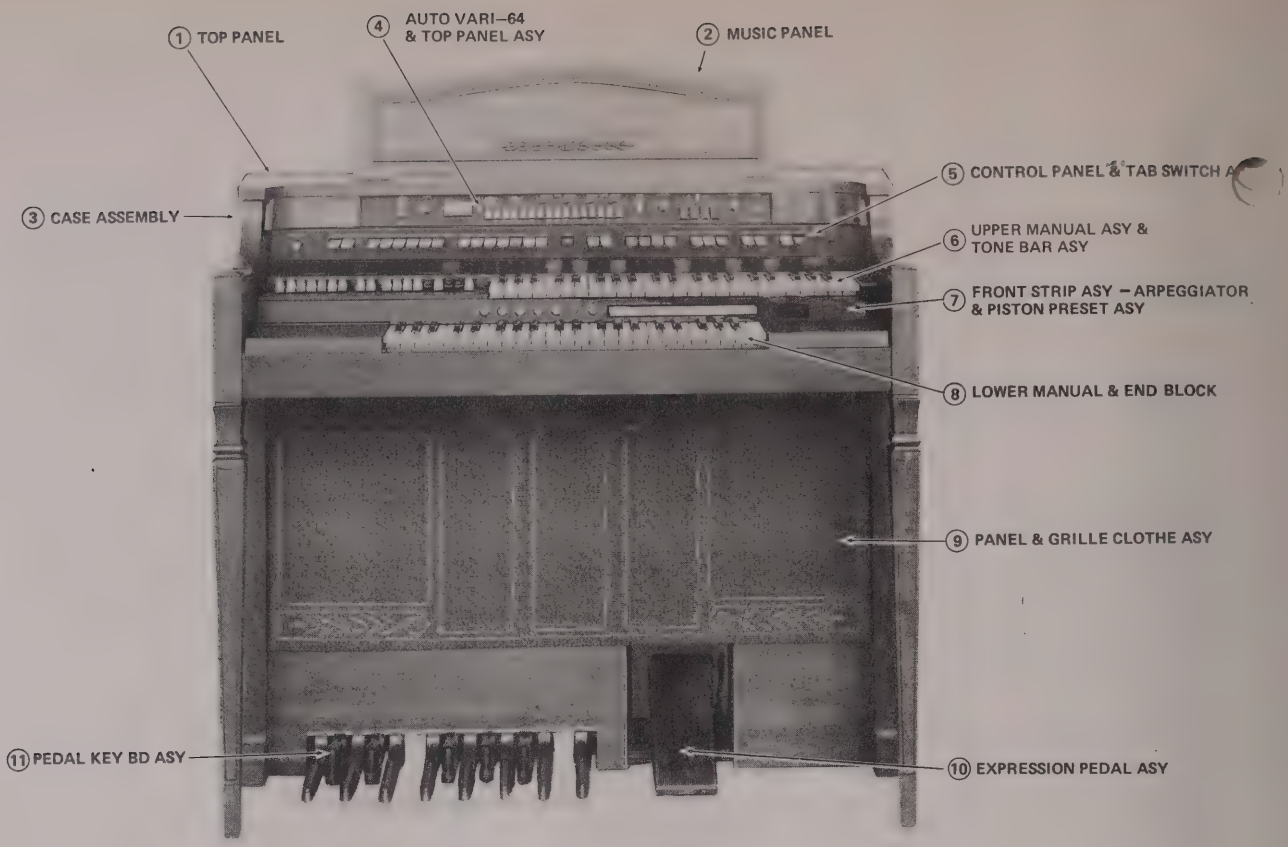

1 TOP PANEL
4 AUTO VARI–64 & TOP PANEL ASY
2 MUSIC PANEL
3 CASE ASSEMBLY
5 CONTROL PANEL & TAB SWITCH A
6 UPPER MANUAL ASY & TONE BAR ASY
7 FRONT STRIP ASY – ARPEGGIATOR & PISTON PRESET ASY
8 LOWER MANUAL & END BLOCK
9 PANEL & GRILLE CLOTHE ASY
11 PEDAL KEY BD ASY
10 EXPRESSION PEDAL ASY

(1) TOP PANEL

	(8222)	051-002157-001
	(8224)	051-002157
	(8246)	051-002220-003
	(8282)	051-002603
	(8295)	051-002220-004

(2) MUSIC PANEL

	(8222)	051-002195
Hinge	(8222)	032-033414
Screw	(8222)	882-030737
MUSIC PANEL		
	(8224)	051-002872
Hinge	(8224)	032-033414
Screw	(8224)	882-030737
MUSIC PANEL		
	(8246)	025-049139
Hinge	(8246)	025-049554
Screw	(8246)	882-030537
MUSIC PANEL		
	(8282)	025-050886
Hinge	(8282)	032-033414
Screw	(8282)	882-030537

(3) CASE ASSEMBLY

	(8222)	051-002151-001
	(8224)	051-002870
	(8246)	051-002625
	(8282)	051-002601
	(8295)	051-002630

BENCH ASSEMBLIES (Not Shown)

	(8222)	152-000009
	(8224)	152-000061
	(8282)	152-000108

(4) AUTO VARI - 64 & TOP PANEL ASSEMBLY

Control Panel	061-050626
Hinge Assembly	060-051266
Support Arm Assembly	032-049639
Lid Support	032-049911
Auto Vari-64 Assembly	125-000113
See Auto Vari-64 Exposed View Page 4-10	
Cable & Diode Assembly	011-051111
Knob-(Gold) 3 Used.....	031-046282-003
Toggle Cap-(Yellow)1 Used..	025-050616-000
Toggle Cap-(Gold).....	025-050616-001
Toggle Cap-(Yellow)2 Used..	025-050617-000
Toggle Cap-(Green).....	025-050617-001

(4) AUTO VARI - 64 & TOP PANEL ASSY. (CONTINUED)

Knurled Nut	013-039984
MUSIC LIGHT ASSEMBLY	063-046103
Lens	026-046367
Lamp Holder	016-042766
Lamp	016-031749
Cable & Switch Assy.....	011-044345
Transformer & Plug Assy. (120V/60HZ).....	003-046372
Transformer & Plug Assy. (240V/50HZ).....	003-051251

(5) CONTROL PANEL & UNDER TOP ASSEMBLY

Control Panel	061-049793
Spacer Strip	041-049150
Mtg. Brkt. (Cam Latch Assy. L.H.).....	032-049750
Potentiometer (Repeat Rate).	676-000162
Knob (Gold)	031-046282-002
Felt (Adhesive Backed).....	042-045381
Line Switch	008-046165-001
Tab & Switch Assy.	

TAB NAME	TAB ONLY	SWITCH ASSY.
Repeat	031-045267-063	008-045762
Percussion Fast	031-045267-180	008-045267
2	031-045267-005	008-045766
3	031-045267-006	008-045774
5	031-045267-008	008-045774
Glock	031-045267-182	008-045772
(Twin Mallet)		
Xylophone	031-045267-183	008-045766
(Twin Mallet)		
Marimba	031-045267-184	008-045766
Second Voice	031-045267-185	008-045762
Pizzicato 1	031-045267-195	008-045766
Pizzicato 2	031-045267-196	008-045766
Banjo	031-045267-197	008-045774
Harpsichord	031-045267-198	008-045774
Piano	031-045267-199	008-045774
Piano Solo	031-045267-019	008-045770
Sustain on Upper	031-045267-192	008-045774
Pedal Sustain	031-045267-193	008-045767
Pedal Mute	031-045267-194	008-045765
Acoustic Tremolo On Upper	031-045267-188	008-045764
Acoustic Tremolo On Lower	031-045267-189	008-045764

(5) CONTROL PANEL & UNDER TOP ASSY. (CONTINUED)

TAB NAME	TAB ONLY	SWITCH ASSY.
Acoustic Tremolo Chorus	031-045267-089	008-045772
Acoustic Tremolo Celeste	031-045267-088	008-045771
Vibrato 1	031-045267-060	008-045773
Vibrato 2	031-045267-061	008-045771
Delay Vibrato	031-045267-062	008-045772
Reverb 1	031-045267-082	008-045774
Reverb 2	031-045267-083	008-045765
Brilliance	031-045267-085	008-045767
Volume Soft	031-045267-190	008-045772

COMMON PARTS
- Pivot Shaft 020-045265
- Detent Spring 012-043149
- "U" Clip (Hold Switch Assy. to Panel)..... 013-045744
- Cable Tie (Locking)..... 013-051115-001
- Stud (To Tonebar Base Strip. 044-049153-001
- Stud (Slotted Locking) 044-049752

UNDERTOP ASSEMBLY
- Repeat Osc. Detector Bd..... 124-000409
- Pedal Board 124-000326
- U/M. Sync. Perc. Bd..... 124-000425
- Bright Perc. Filters..... 124-000208
- Mixer #2 Board..... 124-000376
- Mixer #3 Board..... 124-000377
- Bracket (PWB)..... 025-051081
- Speed Clip (PWB)..... 013-028459
- Hinge 032-046428

(6) UPPER MANUAL & TONE BAR ASSEMBLY
- Upper Manual Assy..... 119-000067
- For Key Replacement (See Key & Spring Module Assy. Page 4-8
- End Block (Upper R.H.)..... 025-048905
- Cover Panel (Between U/M & Control Assy..... 061-049798
- Cover Bracket..... 041-047920
- Spacer Strip 041-049151
- Screw (Flathead) 937-050534
- Light Emitting Diode Assy... 016-051164
- Mounting Clip 013-060620
- Mounting Collar 013-060620
- Tone Bar (Stop Switch)Base.. 041-049237
- Wire Guides 006-045721

LOWER MANUAL TONE BAR (STOP SWITCH) ASSEMBLY 120-000069
- Mounting Block Assy..... 063-049814
- Contact Spring Assy..... 012-033222
- Tone Bar Assembly — KNOB (ONLY)
- 8' Green .....060-048396.... 031-048412
- 8' Yellow ....060-048397.... 031-048413
- 4' Green .....060-048398.... 031-048414
- 4' Yellow.....060-048399.... 031-048415
- 2' Green .....060-048400.... 031-048416
- 2' Yellow ....060-048401.... 031-048417
- 1' Green .....060-048402.... 031-048418
- Hex Screw 909-030534
- Clamp Spring..... 012-027613
- Tone Bar Stop 025-040198
- Pan Head Screw 939-010434
- Bus Bar Lubricant 015-033388

UPPER MANUAL TONE BAR (STOP SWITCH ASSEMBLY..... 120-000070
- Mounting Block Assy..... 063-049984
- Contact Spring Assy..... 012-049984

(6) UPPER MANUAL TONE BAR STOP SWITCH ASSY. (CONTINUED)
- TONE BAR ASSY. — KNOB (ONLY)
- 16' Beige....060-034366..... 031-034347
- 5-1/3' Beige.060-034368..... 031-034349
- 8' Ivory.....060-034352..... 031-034333
- 4' Ivory.....060-034357..... 031-034338
- 2-2/3' Black 060-034358..... 031-034340
- 2' Ivory ....060-034359..... 031-034341
- 1-3/5' Black 060-034361..... 031-034342
- 1' Ivory.....060-034362..... 031-034343
- Hex Screw
- Clamp Spring..... 012-027613
- Tone Bar Stop..... 025-040198
- Pan Head Screw..... 939-010434
- Bus Bar Lubricant..... 015-033388

PEDAL TONE BAR(STOP SWITCH)ASSY.. 120-000068
- Mounting Block Assembly..... 063-045699
- Contact Spring Assembly..... 012-033222
- Tone Bar Assy. — KNOB (ONLY)
- 16' Beige...060-034366..... 031-034347
- 8' Beige ...060-034367..... 031-034348
- Clamp Spring..... 012-027613
- Tone Bar Stop..... 025=040198
- Pan Head Screw..... 939-010434
- Bus Bar Lubricant..... 015-033388

(7) FRONT STRIP (ONLY)..... 061-049799

PISTON PRESET SWITCHES ASSEMBLY.. 008-049175
- Piston Switches & PWB..... 124-000367
- Mounting Bracket..... 035-047696
- Button (Knob)..... 025-047699-005

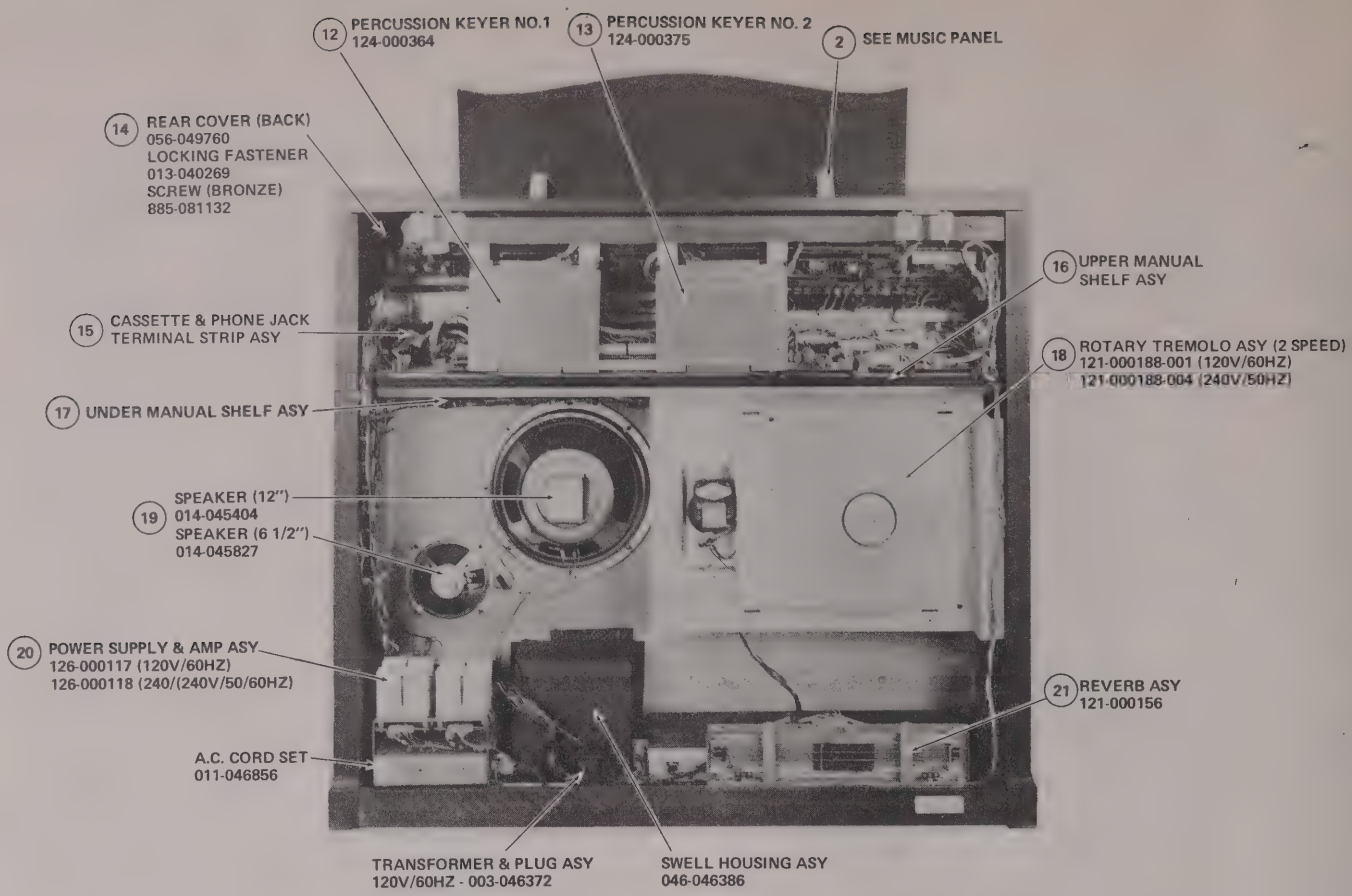
ARPEGGIATOR ASSEMBLY..... 121-000174
- Bezel & Switch Assembly..... 060-051156
- Rocker Switch (Only)..... 008-051109
- Bezel (Only) 025-051515
- Insulator Strip 036-047719
- Spring Strip 012-047706
- Board & Terminal Assembly..... 124-047713
- Spacer 033-049774
- Contact Strip 023-047715
- Pad-Ribbed..... 048-051514

(8) LOWER MANUAL & END BLOCK ASSY.
- Lower Manual..... 119-000066
- See Key Replacement Module Page4-8
- End Block Lower (L.H.)..... 025-048902
- End Block Lower (R.H.)..... 025-049142

(9) PANEL & GRILLE CLOTH ASSY.
- (8222) 052-047934-014
- (8224) 052-047934-014
- (8246) 052-047934-015
- (8282) 052-047934-013
- Frame & Cloth Assy. (8295) 051-002498

(10) EXPRESSION PEDAL ASSEMBLY 123-000070
- See Exposed View Page 4-8
- Trim Strip 055-031802
- Housing Assembly 046-046386

(11) PEDAL KEYBOARD ASSEMBLY 116-000029
- See Exposed View Page 4-6
- Cover 046-045452-001



(12) PERCUSSION KEYER #1 124-000364
See Page 4 -11 for PWB Component Parts List.

(13) PERCUSSION KEYER #2 124-000375
See Page 4 -11 for PWB component Parts List.

(14) REAR COVER (BACK) 056-049760
Locking Fastener 013-040269
Brad 999-040271
Screw (Bronze 885-081132

(15) CASSETTE-PHONE JACK TERMINAL STRIP ASSEMBLY 063-049981
Terminal Strip (Only.....006-030895
Phone Jack (Stereo).....005-049363

(16) UPPER MANUAL SHELF ASSY. (SEE ILLUSTRATION PAGE 4-5
Sync. & Pedal Gate Bd.....124-000361
Upper Manual Preset Bd.....124-000351
M.D.D. Generator Bd.....124-000265
Generator Bd.....124-000321
I.C. Keyer & Divider Bd.....124-000323
HARDWARE BETWEEN ABOVE MENTIONED TWO BOARDS
Screw (Long).....840-000001
Standoff (Long).....044-045580
Standoff (Short).....044-049939
Spacer 062-049945
Lock Nut 999-001432
Bus Amp Board.....124-000362
Arpeggiamatic Board.....124-000415
See Page 4 -11 for PWB component Parts List

(17) UNDER MANAUL SHELF ASSEMBLY
Sine Wave Filter #3 Bd.....124-000204
Sine Wave Filter #2 Bd.....124-000202
Sine Wave Filter #1 Bd.....124-000310
See Page 4-11 for PWB Component Parts List.

(18) ROTARY TREMOLO ASSY.
(120V/60HZ)..... 121-000188-001
(120V/50HZ)..... 121-000188-004
See Exposed Back View Page 4-9

Scrim Cloth 053-043986

(19) SPEAKER 12" 014-045404
SPEAKER 6-1/2"..... 014-045827

(20) POWER SUPPLY & AMP. ASSY.
120V/60HZ 126-000117
240V/50/60HZ..... 126-000118
See Exposed Top View Page 4-7
See Exposed Bottom View Page 4-7
A.C. Cord Set..... 011-046856

(21) REVERBERATION ASSEMBLY.... 121-000156
Reverb Unit (Only)..... 121-000131
Rever Amplifier Bd..... 124-000160
Mounting Bracket..... 035-031465
Grommet..... 043-023844
Eyelet..... 999-023845
Screw 831-080914
Reverb. Lever Lock..... 025-044443

OPTIONAL EQUIPMENT

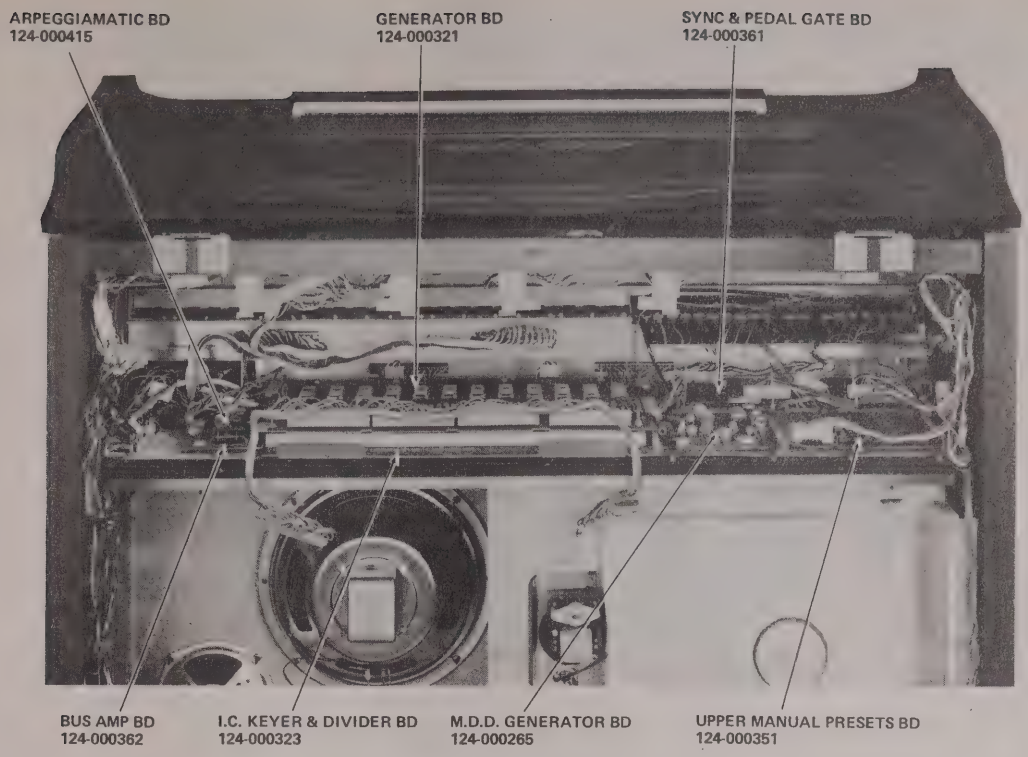
Cassette Kit 130-103001
Head Phone Set 130-910000

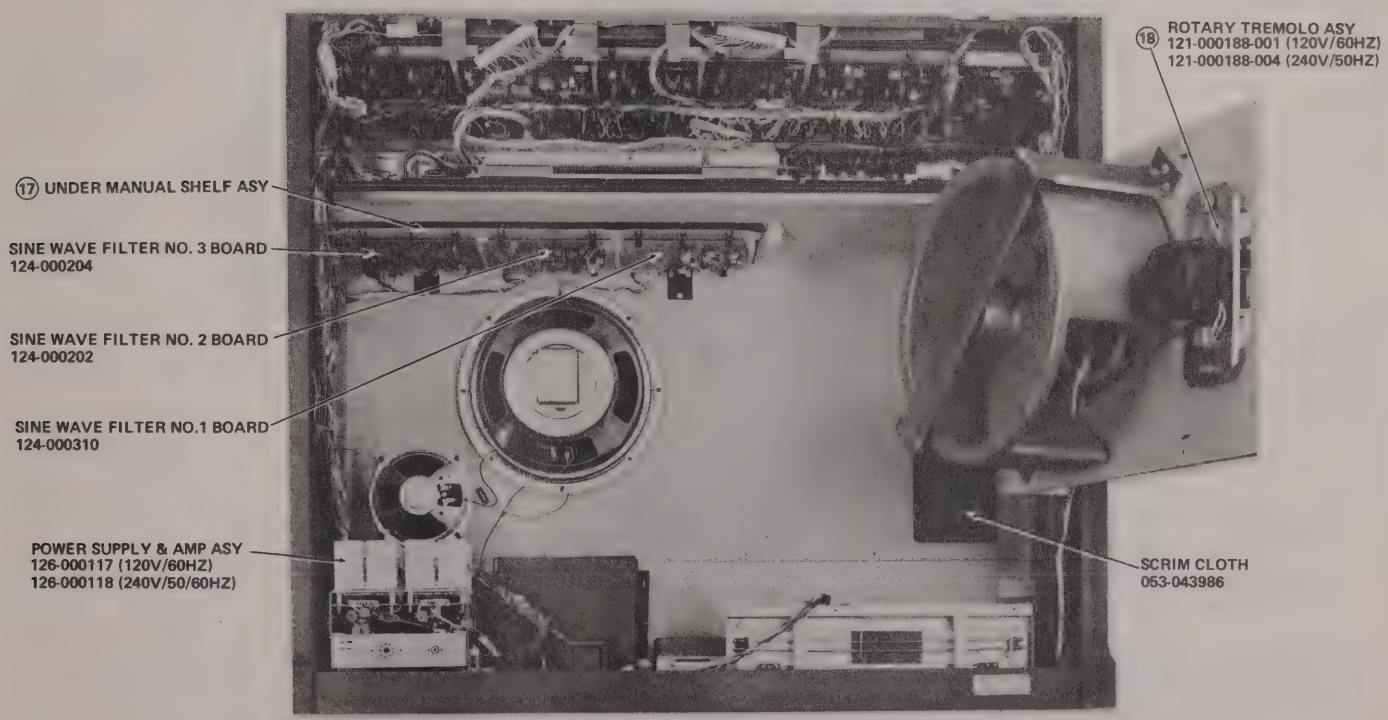
Tone Cabinet - (Leslie 700 Or 710) can be purchased from Hammond Organ Dealer.

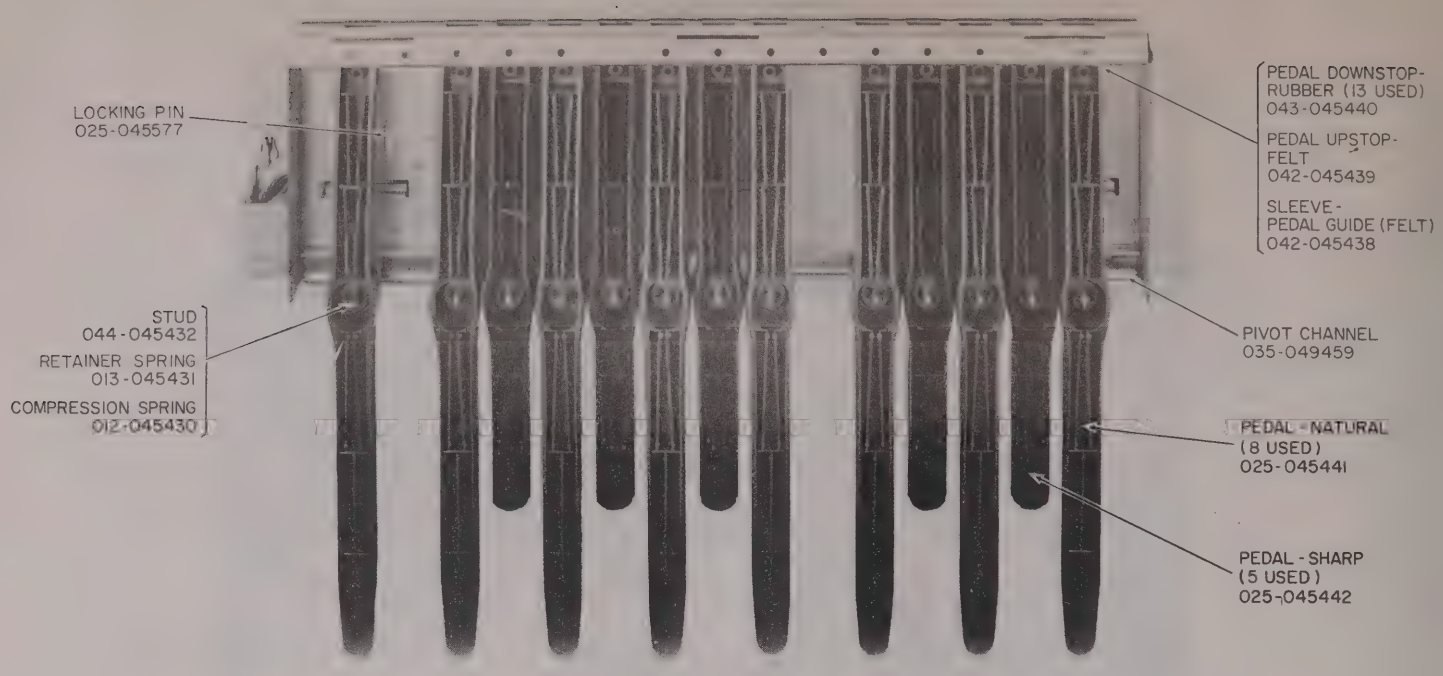
Synthesizer (Series 102100) Can be purchased from Hammond Organ Dealer.

Technical Service Manual
8200 Series HO-1292

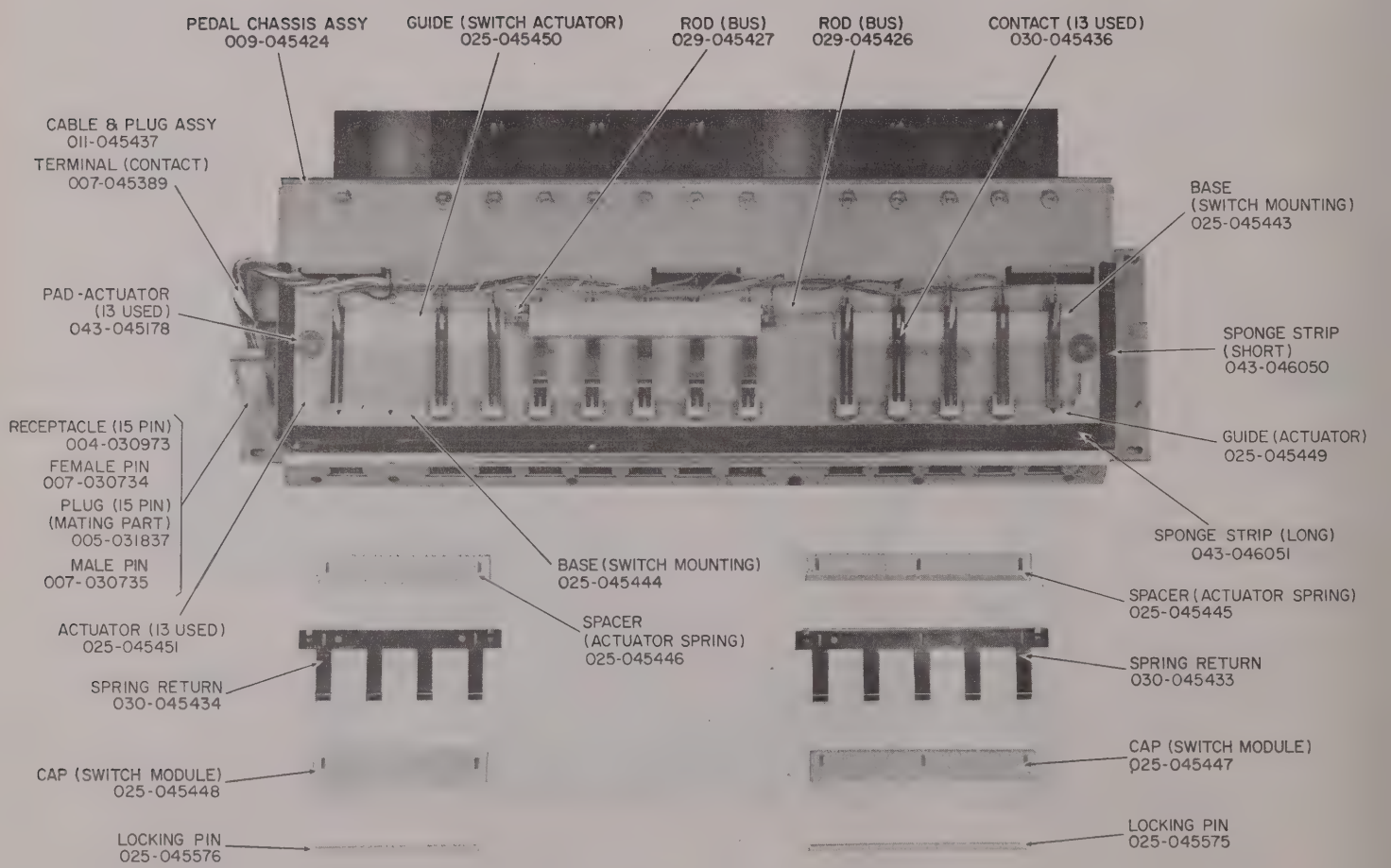
Owner Playing Guide
8200 Series HO-1671


ARPEGGIAMATIC BD
124-000415
GENERATOR BD
124-000321
SYNC & PEDAL GATE BD
124-000361
BUS AMP BD
124-000362
I.C. KEYER & DIVIDER BD
124-000323
M.D.D. GENERATOR BD
124-000265
UPPER MANUAL PRESETS BD
124-000351

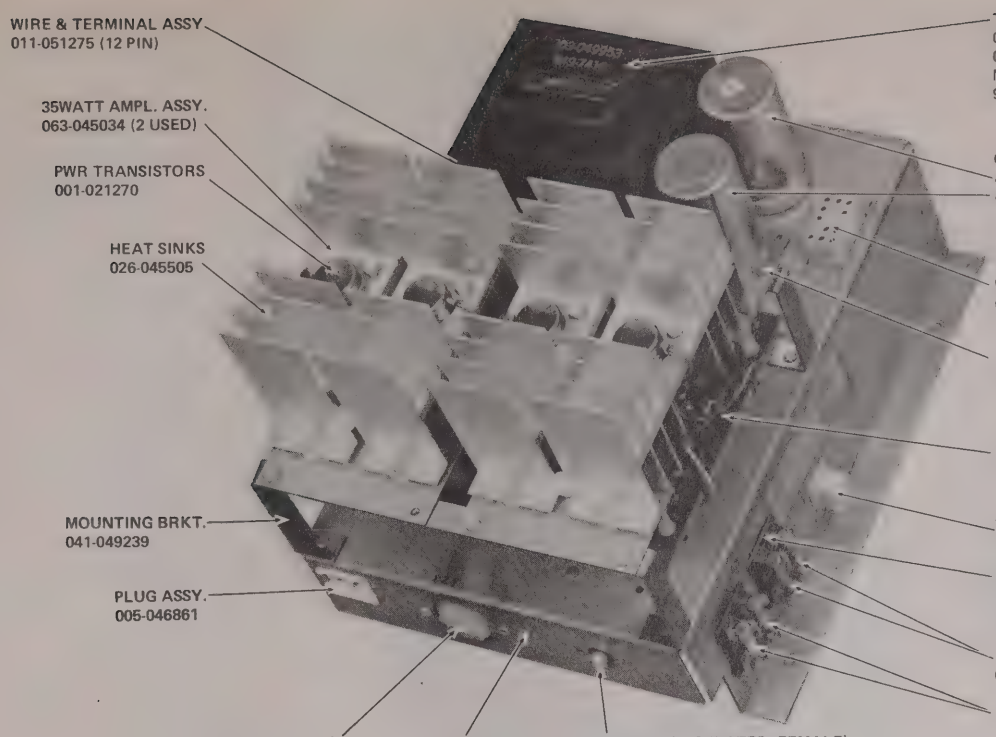

⑱ ROTARY TREMOLO ASY
121-000188-001 (120V/60HZ)
121-000188-004 (240V/50HZ)
⑰ UNDER MANUAL SHELF ASY
SINE WAVE FILTER NO. 3 BOARD
124-000204
SINE WAVE FILTER NO. 2 BOARD
124-000202
SINE WAVE FILTER NO.1 BOARD
124-000310
POWER SUPPLY & AMP ASY
126-000117 (120V/60HZ)
126-000118 (240V/50/60HZ)
SCRIM CLOTH
053-043986

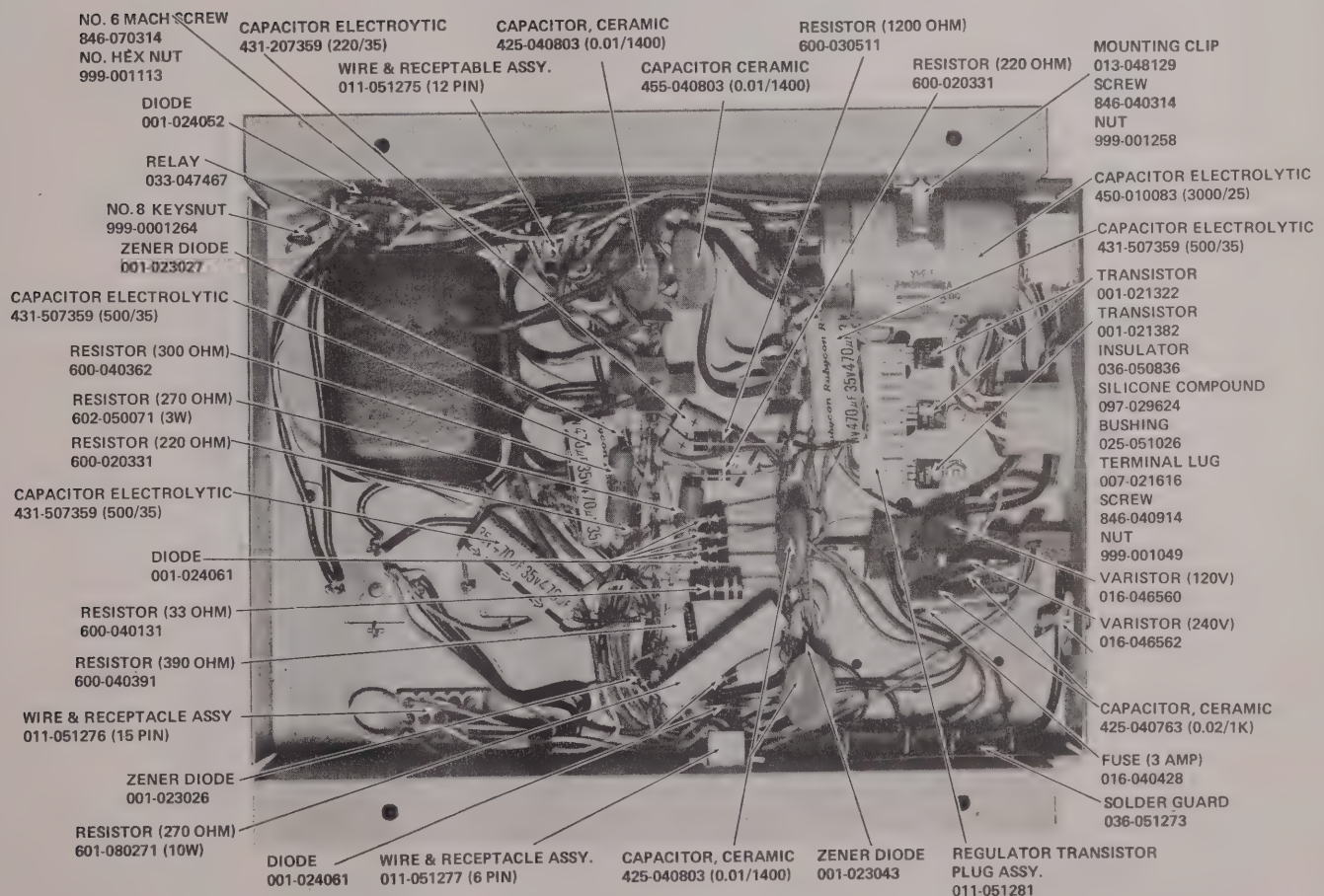


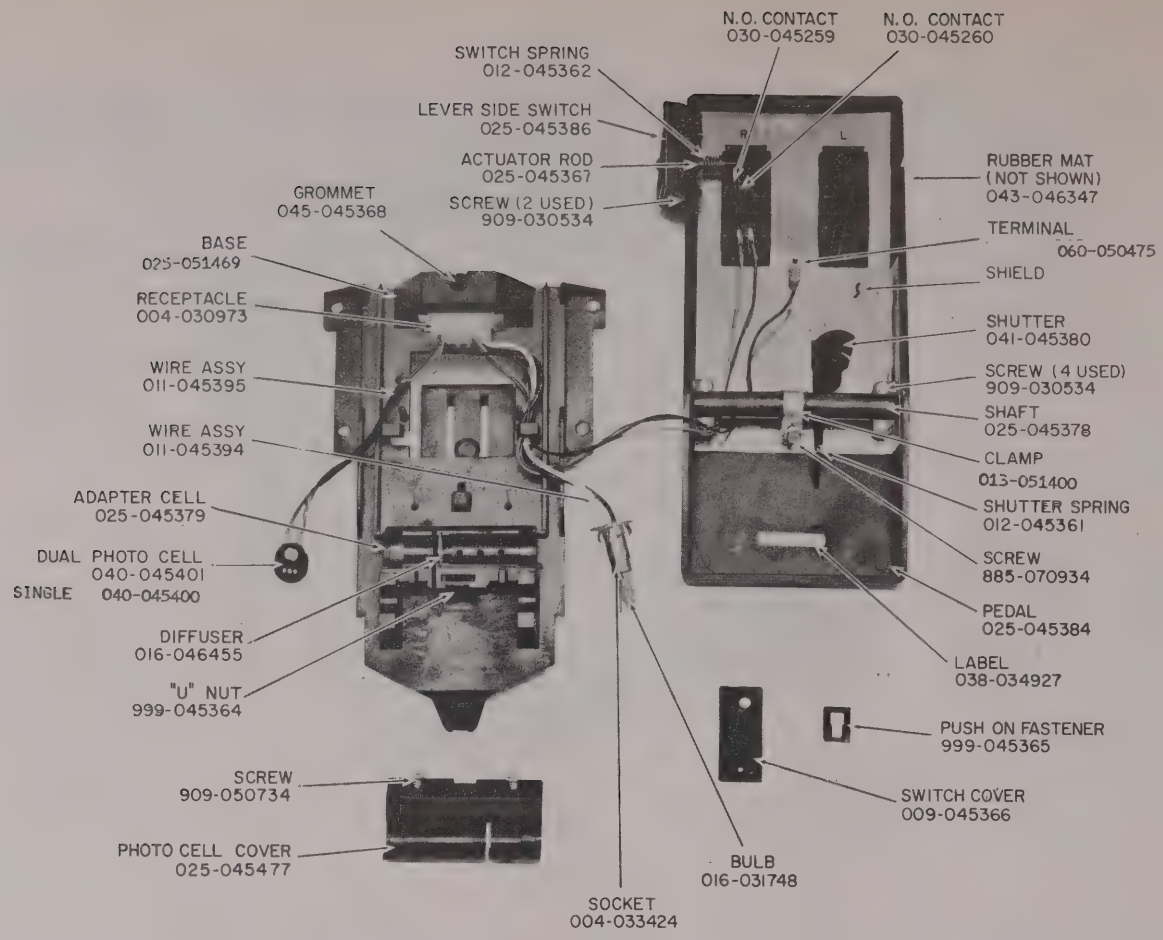
Pedal & Switch Assembly (Bottom View) 116-000029



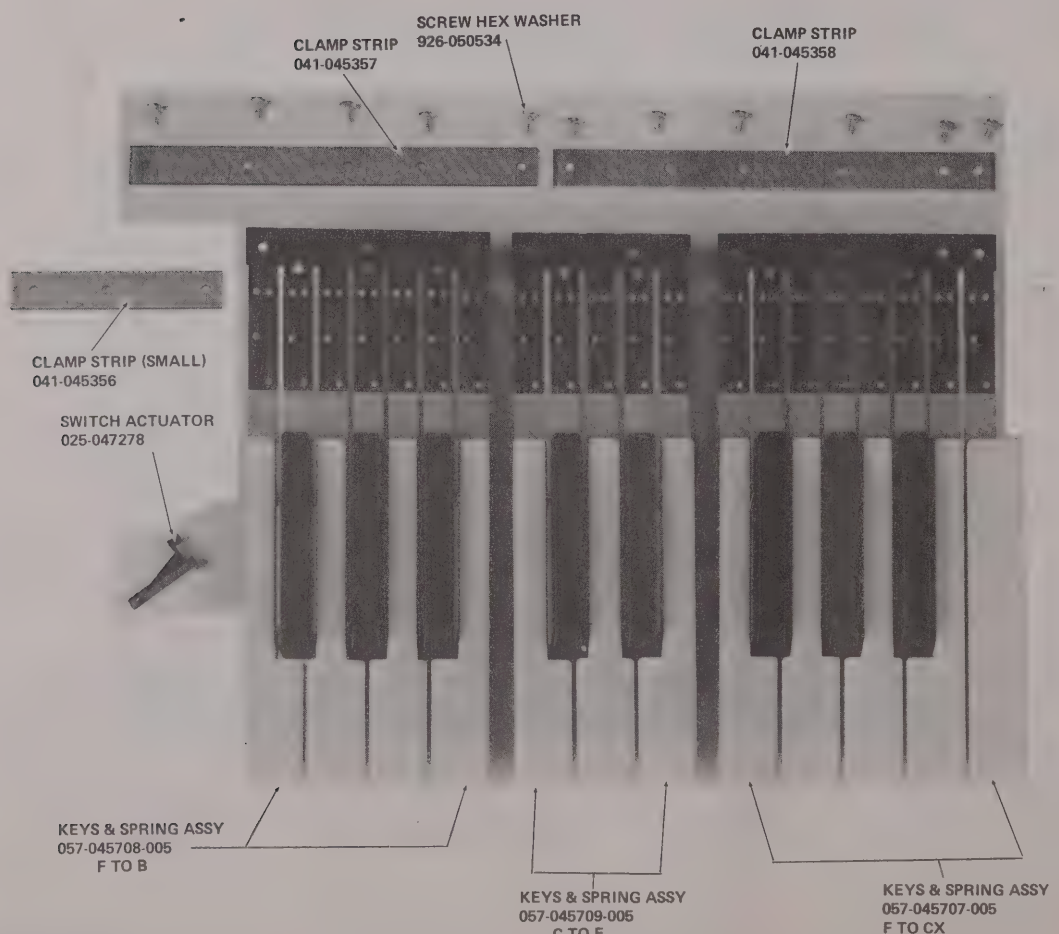
Pedal & Switch Assembly (Top View) 116-000029

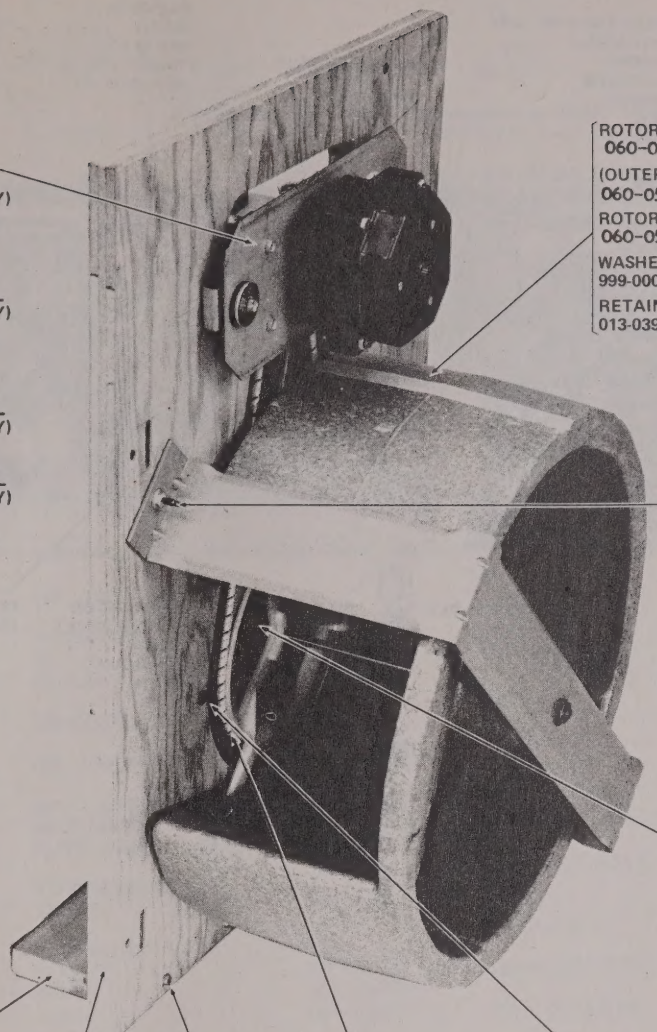

WIRE & TERMINAL ASSY
011-051275 (12 PIN)
35WATT AMPL. ASSY.
063-045034 (2 USED)
PWR TRANSISTORS
001-021270
HEAT SINKS
026-045505
MOUNTING BRKT.
041-049239
PLUG ASSY.
005-046861
SOCKET (9 PIN)
004-050438
CHASSIS ASSY.
060-051262
CONNECTOR (INSULATED, FEMALE)
005-023617
INSULATOR
005-023618
TRANSFORMER
003-049953 (120V 60HZ)
003-049954 (120/240V 50/60 HZ)
NO. 8 NUT
999-001264
CAPACITOR ELECTROLYTIC
450-010081 (220/35)
450-010082 (4000/50)
WIRE & RECEPTACLE ASSY.
011-051276 (15 PIN)
HX. HD. TAPPING SCREW
927-050334
35 WATT AMP BD.
124-000169
WIRE & RECEPTACLE ASSY.
011-051277 (6 PIN)
FUSE HOLDER
016-051019
FUSE COVER (NOT SHOWN)
060-051287
FUSE (SLO-BLO
016-039507 (2 AMP)
FUSE (SLO-BLO)
016-039510 (3 AMP)


NO. 6 MACH SCREW
846-070314
NO. HEX NUT
999-001113
DIODE
001-024052
RELAY
033-047467
NO. 8 KEYSNUT
999-0001264
ZENER DIODE
001-023027
CAPACITOR ELECTROLYTIC
431-507359 (500/35)
RESISTOR (300 OHM)
600-040362
RESISTOR (270 OHM)
602-050071 (3W)
RESISTOR (220 OHM)
600-020331
CAPACITOR ELECTROLYTIC
431-507359 (500/35)
DIODE
001-024061
RESISTOR (33 OHM)
600-040131
RESISTOR (390 OHM)
600-040391
WIRE & RECEPTACLE ASSY
011-051276 (15 PIN)
ZENER DIODE
001-023026
RESISTOR (270 OHM)
601-080271 (10W)
DIODE
001-024061
WIRE & RECEPTACLE ASSY.
011-051277 (6 PIN)
CAPACITOR, CERAMIC
425-040803 (0.01/1400)
ZENER DIODE
001-023043
REGULATOR TRANSISTOR
PLUG ASSY.
011-051281
CAPACITOR ELECTROYTIC
431-207359 (220/35)
WIRE & RECEPTABLE ASSY.
011-051275 (12 PIN)
CAPACITOR, CERAMIC
425-040803 (0.01/1400)
CAPACITOR CERAMIC
455-040803 (0.01/1400)
RESISTOR (1200 OHM)
600-030511
RESISTOR (220 OHM)
600-020331
MOUNTING CLIP
013-048129
SCREW
846-040314
NUT
999-001258
CAPACITOR ELECTROLYTIC
450-010083 (3000/25)
CAPACITOR ELECTROLYTIC
431-507359 (500/35)
TRANSISTOR
001-021322
TRANSISTOR
001-021382
INSULATOR
036-050836
SILICONE COMPOUND
097-029624
BUSHING
025-051026
TERMINAL LUG
007-021616
SCREW
846-040914
NUT
999-001049
VARISTOR (120V)
016-046560
VARISTOR (240V)
016-046562
CAPACITOR, CERAMIC
425-040763 (0.02/1K)
FUSE (3 AMP)
016-040428
SOLDER GUARD
036-051273

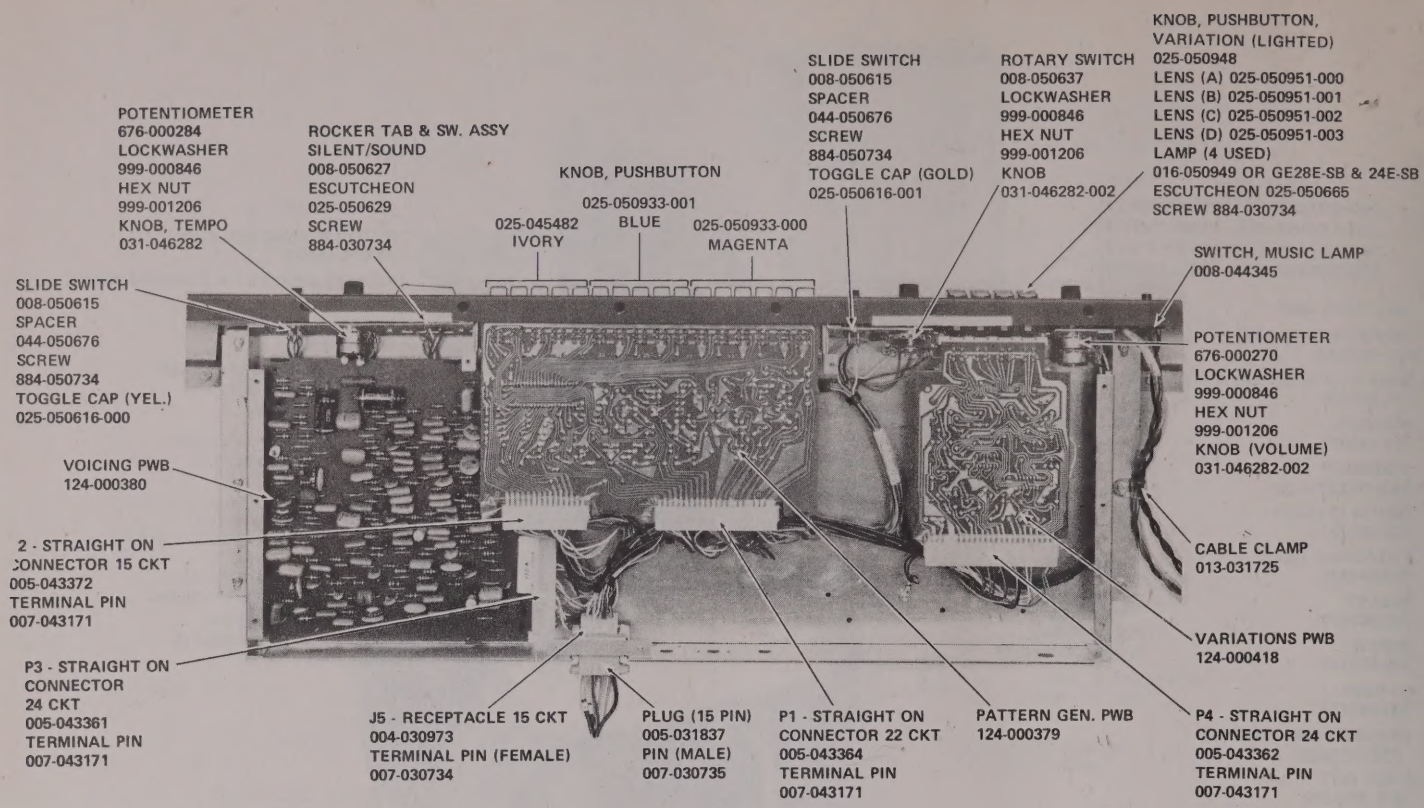

N.O. CONTACT
030-045259
N.O. CONTACT
030-045260
SWITCH SPRING
012-045362
LEVER SIDE SWITCH
025-045386
ACTUATOR ROD
025-045367
SCREW (2 USED)
909-030534
GROMMET
045-045368
BASE
025-051469
RECEPTACLE
004-030973
WIRE ASSY
011-045395
WIRE ASSY
011-045394
ADAPTER CELL
025-045379
DUAL PHOTO CELL
040-045401
SINGLE 040-045400
DIFFUSER
016-046455
"U" NUT
999-045364
SCREW
909-050734
PHOTO CELL COVER
025-045477
SOCKET
004-033424
BULB
016-031748
RUBBER MAT
(NOT SHOWN)
043-046347
TERMINAL
060-050475
SHIELD
SHUTTER
041-045380
SCREW (4 USED)
909-030534
SHAFT
025-045378
CLAMP
013-051400
SHUTTER SPRING
012-045361
SCREW
885-070934
PEDAL
025-045384
LABEL
038-034927
PUSH ON FASTENER
999-045365
SWITCH COVER
009-045366

123-000070


CLAMP STRIP
041-045357
SCREW HEX WASHER
926-050534
CLAMP STRIP
041-045358
CLAMP STRIP (SMALL)
041-045356
SWITCH ACTUATOR
025-047278
KEYS & SPRING ASSY
057-045708-005
F TO B
KEYS & SPRING ASSY
057-045709-005
C TO E
KEYS & SPRING ASSY
057-045707-005
F TO CX



TREMOLO ASSEMBLY-2 SPEED
121-000188-001 THRU 004 (9400-9500 MODELS)


POTENTIOMETER
676-000284
LOCKWASHER
999-000846
HEX NUT
999-001206
KNOB, TEMPO
031-046282
ROCKER TAB & SW. ASSY
SILENT/SOUND
008-050627
ESCUTCHEON
025-050629
SCREW
884-030734
KNOB, PUSHBUTTON
025-045482
IVORY
025-050933-001
BLUE
025-050933-000
MAGENTA
SLIDE SWITCH
008-050615
SPACER
044-050676
SCREW
884-050734
TOGGLE CAP (GOLD)
025-050616-001
ROTARY SWITCH
008-050637
LOCKWASHER
999-000846
HEX NUT
999-001206
KNOB
031-046282-002
KNOB, PUSHBUTTON,
VARIATION (LIGHTED)
025-050948
LENS (A) 025-050951-000
LENS (B) 025-050951-001
LENS (C) 025-050951-002
LENS (D) 025-050951-003
LAMP (4 USED)
016-050949 OR GE28E-SB & 24E-SB
ESCUTCHEON 025-050665
SCREW 884-030734
SWITCH, MUSIC LAMP
008-044345
SLIDE SWITCH
008-050615
SPACER
044-050676
SCREW
884-050734
TOGGLE CAP (YEL.)
025-050616-000
POTENTIOMETER
676-000270
LOCKWASHER
999-000846
HEX NUT
999-001206
KNOB (VOLUME)
031-046282-002
VOICING PWB
124-000380
2 - STRAIGHT ON
CONNECTOR 15 CKT
005-043372
TERMINAL PIN
007-043171
CABLE CLAMP
013-031725
VARIATIONS PWB
124-000418
P3 - STRAIGHT ON
CONNECTOR
24 CKT
005-043361
TERMINAL PIN
007-043171
J5 - RECEPTACLE 15 CKT
004-030973
TERMINAL PIN (FEMALE)
007-030734
PLUG (15 PIN)
005-031837
PIN (MALE)
007-030735
P1 - STRAIGHT ON
CONNECTOR 22 CKT
005-043364
TERMINAL PIN
007-043171
PATTERN GEN. PWB
124-000379
P4 - STRAIGHT ON
CONNECTOR 24 CKT
005-043362
TERMINAL PIN
007-043171

AUTOVARI – 64

124-000166 REVERBERATION BOARD ASSEMBLY

PWB (NO PARTS)		023-044507
POTENTIOMETER		
R20	50K	676-000069
CAPACITORS		
ELECTROLYTIC		
C3	5/50V	407-080539
C11	5/50V	407-080549
C4	100/25V	407-060349
C6	200 V	407-060849
DIODE		
D1,2		001-026080
TRANSISTOR		
Q7		001-021260
Q1		001-021070
Q5		001-021232
Q4		001-022032
Q2,3,8		001-021133

124-000169 PRINTED WIRING BOARD ASSEMBLY

PWB (NO PARTS)		023-044884
CAPACITOR		
ELECTROLYTIC		
C1,3	5/50V	407-080549
C4,7	50/25V	407-060649
C6	100/50V	407-080669
DIODE		
D1		
THRU		
D8		001-026080
TRANSISTOR		
Q1,2	NPN	001-021100
Q3	PNP	001-022040
Q4	PNP	001-022050
Q5	NPN	001-021240

124-000202 PRINTED WIRING BOARD ASSY. #2

CAPACITOR		
ELECTROLYTIC		
C48	5mf/50V	431-056059
C51	10mf/50V	431-106509
C52	500mf/35V	431-507359
C23,24	50mf/25V	432-506259
C1,12	100mf/15V	432-107159
Transistor		
Q3,6,9,12	NPN	001-021135
Q13,14	NPN	001-021260
Q1,4,7,10	PNP	001-021172
Q2,5,8,11	NPN	001-021260

124-000204 PRINTED WIRING BOARD ASSY.

PWB (NO PARTS)		023-045855
TRANSISTOR		
Q1,4,7,10,13	PNP	001-021172
Q2,5,8,11	NPN	001-021260
Q3,6,9,12,14	NPN	001-021135
CAPACITOR		
ELECTROLYTIC		
C23,34,45	50mfd/25V	432-506259
C1,12	100mfd/15V	432-107159

124-000208 BRIGHT PERCUSSION FILTER

CAPACITOR		
ELECTROLYTIC		
C10	100/25V	407-060349
C12,32	5/50V	407-080549
TRANSISTOR		
Q5,1		001-021070
Q7,8		001-021260
Q3		001-021260
Q11		001-021132
Q9,10		001-021133
Q4,12		001-021135
Q2,6	001-021172	
POTENTIOMETER		
TRIMMER	100K	
R17,7,44,69	1/8W	676-000073
R28	250K	
	1/8W	676-000077

124-000265 MDD GENERATOR

POTENTIOMETER		
R20	1000 OHMS	676-000057
R6	50K	676-000069
R10	250K	676-000077
CAPACITOR		
ELECTROLYTIC		
C8,9	5/50V	407-080549
C6,7	50/25V	407-060679
C20	100/25V	407-060349
TANTALUM		
C2	4.7/25V	414-040132
TRANSISTOR		
Q4,6,7,9		001-021133
Q2,3		001-021135
Q1		001-021170
Q5		001-021100
DIODE		
D1,2,4,7 THRU 24		001-026080
D3 VARICAP		001-026090
DIODE		
ZENER		
D5	16V	001-223038
D1	5V	001-223030
COIL		
L1	10-2uh	003-046269

124-000310 SINE WAVE FILTER BOARD ASSY.

PWB (NO PARTS)		
TRANSISTOR		
Q5,7,9	NPN	001-021260
Q6,8,10	NPN	001-021135

124-000321 GENERATOR BOARD

PWB (NO PARTS)		023-047999
WAFER ASSY.	12 CIRC.	005-044533
WAFER ASSY.	10 CIRC.	005-044536
WAFER ASSY.	6 CIRC.	005-044742
POTENTIOMETER		
TRIMMER	220 OHM	676-000053
INTEGRATED		
CIRCUIT		075-000380
SOCKET		004-046770
DIODE		001-226080

124-000323 KEYER DIVIDER BOARD

PWB (NO PARTS)		023-048934
CONNECTOR		005-048868
CONNECTOR		005-049230
INT. CIRCUIT		075-000429
INT. SOCKET		004-046770
DIODES		001-226080

124-000326 PEDAL BOARD

PWB (NO PARTS)		023-049000
PRINTED DIVIDER NETWORK		058-028540
CAPACITOR		
ELECTROLYTIC		
C24	10/50V	432-106509
C5	25/50V	432-256509
C33	100/25V	431-107259
Transistor		
Q1,2,5,6,7,9,10,11,12		
15,16,17,22,23		001-021072
Q8,13,18,19,20,21		001-021173
Q3,4,26,27,28		001-021133
Q14		001-021134
Q24,25		001-021260
Q29,30		001-021260-001
Diode		
D1,2,4 THRU 17		001-226080
POTENTIOMETER		
R13	220 OHM	676-000053
R26	1K	676-000057
R98,101	5K	676-000061
R82	250K	676-000077

124-000351 UPPER MANUAL PRESET BOARD

PWB (NO PARTS)		023-049703
TRANSISTORS		
Q1-Q18, Q26,27		001-021172
Q19-Q25		001-021134
DIODES		
D1-D47		001-226080
Locking Wafer Connector		005-051170
Wafer Assy.		005-044742

124-000361 PEDAL SYNC.

PWB (NO PARTS)		023-049905
Wafer Assy.	12 Circuit	005-044741
Wafer Assy.	15 Circuit	005-044743
DIODE		
D1 thru D25		001-226080
CAPACITOR		
ELECTROLYTIC		
C1 THRU C13		407-080539
TRANSISTOR		
Q1 THRU Q26		001-021172

124-000362 LOWER MANUAL BUS AMP.

PWB (NO PARTS)		023-049924
CAPACITOR		
ELECTROLYTIC		
C1,5,10,15		432-107159
C21		431-107259
C20		431-207359
TRANSSITOR		
Q5		001-021172
Q1 THRU Q4		001-021134

124-000364 PERCUSSION KEYER #1

PWB (NO PARTS)		023-049006
DIODE		
D1 THRU D132		001-226080

124-000375 PERCUSSION KEYER #2

PWB (NO PARTS)		023-049006
DIODE		
D1 THRU D132		001-226080

124-000376 MIXER BOARD #2

PWB (NO PARTS)		023-046800
TRANSISTOR		
Q1,2,3,4,6,7,13		001-021135
CAPACITOR		
ELECTROLYTIC		
	200 mfd/35V	431-207359
	10 mfd/50V	432-106509

124-000377 MIXER #3 BOARD

PWB (NO PARTS)		023-046806
TRANSISTORS		
Q1,2,4,5,6		001-021135
Q7		001-021260
POTENTIOMETER		676-000077
CAPACITOR		
ELECTROLYTIC		
	4.7 mfd/50V	431-056509
	10mfd/50V	431-106509
	47 mfd/25v	431-506259
	200 mfd/35V	431-207359

124-000379 PATTERN GENERATOR BOARD

PWB (NO PARTS)		023-050654
TRANSISTORS		
Q1		001-026050
Q2,6,11,12,16,17		001-021133
Q7,8,15		001-021172
Q13,14		001-021135
DIODES		
D1,14		001-226080
INTEGRATED CIRCUIT		
IC1		075-000430
CAPACITORS		
CERAMIC	.01mfd/500V	426-010743
	.05mfd/100V	427-170095
SWITCH ASSEMBLY RHYTHM		008-050612

124-000380 VOICING BOARD

PWB (NO PARTS)		023-050669
TRANSISTORS		
Q1,5,8,12,14		001-021134
Q6,7,10,11,13,19		001-021135
Q9		001-021211
Q15,16		001-021172
Q17,18		001-021260
Socket		004-048898
DIODES		
D1-D20		001-026080
Zener		
D21	14V,1W	001-023026
POTENTIOMETER		
	10K,1/8W	676-000064
	50K/1/8W	676-000069
CAPACITOR		
TANTALUM		
	.047/35V	435-474352
	1.0/35V	435-105354
ELECTROLYTIC		
	10/50V	432-106509
	200/35V	431-207359
CHOKE		
L1,L2	45MH	003-030753

124-000409 REPEAT OSCILLATOR & DETECTOR BD.

PWB (NO PARTS)		023-049715
TRANSISTOR		
Q1,3,7,9,13,21,23,24		001-021134
Q14,20,22		001-021172
Q8	PUT	001-026050
DIODE		
D1-D14		001-226080
CAPACITOR		
ELECTROLYTIC		
	47mfd/25V	431-506259

124-000415 ARPEGGIATOR BOARD

PWB (NO PARTS)		023-051213
TRANSISTOR		
Q1,2		001-021134
DIODE		
D1 THRU D44		001-226080

124-000418 VARIATION BOARD

PWB (NO PARTS)		023-050937
TRANSISTORS		
Q1,8		001-021135
DIODES		
D1,13		001-026080
INTEGRATED CIRCUIT		
IC1,IC2		075-000100
SWITCH VARIATION		008-050673
LAMP, INDICATOR		016-050949

124-000425 U/M SYNTHESIS

PWB (NO PARTS)		023-051393
DIODE		
D1 THRU D10		001-226080